A Comparative Study of Participatory and Household Risk Assessments and an Investigation into the Impact of a Participatory Risk Assessment to Effect Change. Case Study: Section D, Sweet Home Farm, Cape Town

Thesis submitted in partial fulfilment of the requirements for the degree of Master of Philosophy

Disaster Risk Science

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"For I know the plans I have for you," says the LORD.
"They are plans for good and not for disaster, to give you a future and a hope."

Jeremiah 29:11 (The Bible, New Living Translation)

ABSTRACT

The aim of this research was to compare the respective contributions of Participatory Action Research (PAR) and household surveys to inform understanding of informal settlement risks and the impact/influence of PAR to effect change. This was achieved by examining urban risks in Section D of Sweet Home Farm informal settlement in the City of Cape Town, through the lenses of community risk assessment (CRA) and household survey methodologies, which were conducted sixteen months apart.

The results described a risk profile for the study site, which was similar to that of many of Cape Town's informal settlements. However, there was more of a concern over chronic 'everyday' threats, such as the disposal of solid waste and crime, rather than fire and flood, which are prioritised by the City. This stressed the need for risk assessments at the local level.

The survey detected a number of cross-cutting risk drivers, for instance behavioural and temporal factors that exacerbate fire and crime risks. However, a "root" cause that cut across all risks was Section D's occupation of private land. This underlines the fact that human rather than natural drivers play a central role in increasing risk.

When the two approaches were compared, both assessments produced broadly converging results, although findings from the CRA were richer than the household survey. However, one factor that emerged was that appropriate use of questionnaires could enhance participation, particularly in the case of shy and marginalised residents.

Despite the convergence of results, the emergence of crime as the priority threat in the household survey raised important questions about the use of PAR tools such as hazard identification, as there is a lack of critical literature on them.

With reference to the capacity of PAR to effect developmental change, the study's findings were inconclusive. Although there had been a marked improvement in solid waste management during the 16 month period between the two assessments, neither the respondents nor the key informants attributed this to the CRA. There was little evidence of any community action to reduce risk, possibly due to the short time frame of the CRA and lack of local political support. This underlined the need to link knowledge creation to the development process and the importance of political participation. Improvements in solid waste management were due to a complementary effort between local government and individual households. While this may not be directly attributable to the CRA, the timing of these interventions after the CRA took place suggests that it may have played an implicit enabling role.

LIST OF ACRONYMS

CBD	Central Business District
CoCT	City of Cape Town
CPF	Community Police Forum
CRA	Community Risk Assessment
CVA	Capacities and Vulnerabilities Analysis
DFID	Department for International Development
DiMP	Disaster Mitigation for Sustainable Livelihoods Programme
DRR	Disaster Risk Reduction
EM-DAT	The Emergencies Events Database
GIS	Geographical Information Systems
GNP	Gross National Product
GPS	Global Positioning System
HFA	Hyogo Framework for Action
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ID	Identity Documents
IFRC	International Federation for Red Cross and Red Crescent Societies
ISDR	International Strategy for Disaster Reduction
LECZ	Low Elevation Coastal Zone
MANDISA	Monitoring, Mapping and Analysis of Disaster Incidents in Southern Africa
NGO	Non-Governmental Organisation
ORS	Oral Rehydration Solution
PAR	Participatory Action Research
PAR	Pressure and Release Model
PLA	Participatory Learning and Action
PPGIS	Public Participation Geographical Information Systems
PRA	Participatory Rural Appraisal
SAPS	South African Police Service
SARCC	South African Rail Commuters Corporation
SLA	Sustainable Livelihoods Approach
TB	Tuberculosis
UCT	University of Cape Town
UN	United Nations
VCA	Vulnerability and Capacity Analysis

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CHAPTER 1

INTRODUCTION

"Many natural phenomena would not become disasters, or if they did would cause far less damage, were it not for the characteristic 'normal conditions' of underdevelopment in which people have been forced to live, in their attempts to adapt to social and economic conditions and contexts far beyond their control" (Oliver-Smith, 1999: 31, 32)

1.1 Introduction

According to the United Nation's International Strategy for Disaster Reduction (ISDR) (ISDR, 2005), losses due to disaster events are on the increase. In the past, disasters were viewed as unexpected natural events caused by hazards outside the experience of development, which could be controlled by engineering, technology and post disaster relief intervention. Today, they are largely regarded as the product of social, political and economic environments, which cause vulnerability to extreme, but normal, natural events (Wisner *et al*., 2004). This paradigm shift has moved the responsibility for disasters from a focus on hazards to the failure of development, which has resulted in a change in how disasters are managed, from reactive disaster management toward a more proactive developmental disaster risk reduction approach (ISDR, 2005).

In addition to this increasing developmental approach, there has been a growing awareness of the importance of involving people who live in disaster prone areas in the risk reduction process. This involvement, often referred to as 'participation', is an approach based on the belief that if the public participate in development activities, actions are likely to have more legitimacy and be more sustainable, while at the same time empowering participants to become more self-reliant (Chambers, 1997; Theron, 2009).

This need for participation in risk reduction is emphasised by the ISDR's (n.d.) 'Mission and Objectives', which states that, "The more decision-makers at all levels commit themselves to disaster reduction policies and actions, the sooner communities vulnerable to natural disasters will benefit from applied disaster reduction policies and actions. This requires, in part, a grassroots approach whereby communities at risk are fully informed and participate in risk management initiatives".

Participation is also emphasised in the Hyogo Framework for Action (HFA), which acts as a global reference point for disaster risk reduction (DRR). It asserts that, "Both communities and local authorities should be empowered to manage and reduce disaster risk by having access to the necessary information, resources and authority to implement actions for disaster risk reduction" (ISDR, 2005: 5).

Reflecting this global emphasis, in South Africa, section (2) (f) (ii) of article 7 of the National Disaster Management Act 57 of 2002 states, "The national disaster management framework must… place emphasis on measures that reduce the vulnerability of disaster-prone areas, communities and households, and must… facilitate… community participation in disaster management" (RSA, 2009: 13, 14, 15).

A specific challenge identified in the HFA is risk identification and assessment (ISDR, 2005). In response to this, one of the ISDR's priorities for action is to, "identify, assess and monitor disaster risks" (*ibid*, 2005: 5). Similarly, in South Africa, according to section (1) of article 47 of the National Disaster Management Act 57 of 2002, "A municipal disaster management centre must… give guidance to… communities… to assess and prevent or reduce the risk of disasters" (RSA, 2009: 54). Additionally, the National Disaster Management Framework states that, "Disaster risk assessment efforts must actively include the participation of vulnerable communities and households" (RSA, 2005: 31).

As a result of this emphasis on involving local people in risk reduction, a growing number of participatory risk assessments have been undertaken over recent years. Many have been developed by non-governmental organisations (NGOs) and international organisations such as the International Federation of Red Cross and Red Crescent Societies (IFRC). Although the ISDR has no definition, it has been described as:

> *"An approach that uses participatory action research methods to place communities in the lead role for the assessment, active planning, design, implementation and evaluation of activities aimed at reducing the community's risk to disaster"* (ProVention, n.d.).

The importance of participatory risk assessments has been increasingly recognised in recent years. Internationally, in January 2005, at the Kobe/Hyogo World Conference on Disaster Reduction, they were recognised as critical tools for assessing risk at community level with the purpose of informing locally appropriate risk reduction activities (DiMP, 2005).

Similarly, CRA methodologies claim that by using a participatory approach they are more effective in assessing risk and empowering local communities to make improvements (Abarquez and Murshed, 2004; Chiwaka and Yates, n.d.; de Dios, n.d.; Venton and Hansford, 2006).

In South Africa, risk assessments are being 'engaged with' within its informal settlements. This is especially needed in cities like Cape Town, where there are over 100,000 informal dwellings (Rodriques *et al*., 2006), whose occupants live in conditions that make them vulnerable to chronic everyday environmental hazards, such as the problem of the disposal of solid waste and lack of toilets, in addition to risk events such as fire, crime and severe storms. One of Cape Town's informal settlements is Sweet Home Farm, which is the focus of this study. It experiences regular flooding and fire events in addition to chronic problems connected to poverty and poor environment.

1.2 The Problem

At an international workshop that reviewed existing participatory risk assessments (DiMP, 2005), it was argued that although many were meant to be for the benefit of the community, the tools used did not actively involve them in the process. Criticisms were also made of the World Bank and International NGOs for making misleading claims where extractive methods had been used in the name of 'participatory' work (*ibid*).

The findings of participatory risk assessments are recognised as important because they are used to understand disaster risk at community level, thus providing the basis for planning and implementing measures (Kohler *et al*., 2004). However, Pelling (2007) argues that the lack of common understanding around them has led to misplaced or

exaggerated claims of participation, inclusiveness or, perhaps most difficult of all, empowerment.

Pelling's observations raise important concerns about the integrity of the participatory process as applied in contemporary risk assessments. Similarly, they point to significant shortcomings in the level of critical reflections by practitioners applying such methods in diverse risk environments.

1.3 Aims and Objectives

In this context, Cape Town's informal settlements present an instructive setting for critically examining contemporary approaches to community risk assessments. A case study methodology was used for Section D, Sweet Home Farm informal settlement, Cape Town, where a participatory risk assessment was completed in 2009.

The aim of this research was to compare the respective contributions of Participatory Action Research (PAR) with household surveys in order to inform understanding of informal settlement risks, and to assess the impact/influence of PAR in effecting change. It sought to achieve this by:

1. Investigating the risk profile of Section D, Sweet Home Farm through the application of a household survey methodology. This specifically involved:
   - Conducting a risk assessment that focused on four perceived priority hazards identified in a previous community risk assessment.
   - Consolidating findings of priority risks to identify recurrent vulnerability factors.
   - Conducting a spatial analysis of risk within Section D.
2. Investigating and comparing risk assessment results generated by the household survey risk assessment with the community risk assessment, specifically:
   - Identifying areas of convergence and divergence, and strengths and weaknesses of each risk assessment approach.
   - Comparing residents' views towards both risk assessment approaches.
3. Examining the developmental potential of participatory risk assessment as an action research methodology through documented and observed changes in solid waste[1] management at governmental, community and household level. This specifically involved:
   - Identifying whether there were any changes in solid waste-related risk between 2009 and 2010.
   - Investigating the reasons for any changes, including factors that may have helped or hindered change.

[1] **Solid waste** is classified into two main categories: general and hazardous waste. **General waste** does not pose an immediate threat to people or the environment and includes household waste, builder's rubble, garden refuse, dry industrial and commercial waste. It may, however, with decomposition and infiltration by water, produce leachate (the liquid that oozes out of waste) which may have pollution potential and is likely to have hazardous properties. **Hazardous waste** is any waste that may cause or be likely to cause, danger to health or to the environment, whether by itself or when it comes in contact with other waste (CoCT, 2007: 2).

1.4 Summary

Chapter Two reviews current literature. It starts by providing an overview of the evolution of the disaster risk discourse, discussing paradigm shifts within the field, core concepts within the domain and the main frameworks for interpreting disaster risk. This is followed by a look at the progression of participatory development, arguing that participation is fundamental to the contemporary view of development. This is then followed by a comparison of traditional and participatory approaches to social science research. The chapter then focuses on participatory research, reviewing widely used approaches and recurring features of participatory approaches. The penultimate section introduces the key elements of risk assessments and goes on to explore the role of participatory risk assessments.

Chapters Three to Five provide the research element of the thesis. Chapter Three describes the geographical, historical, socio-demographic and risk profile of the study site. The methodology for the study is presented in Chapter Four. Chapter Five presents the findings for this study. This chapter initially describes the socio-demographic profile of survey respondents, followed by the results of the household survey risk assessment. It then presents the findings around solid waste from the community risk assessment. The subsequent section compares findings from both risk assessment approaches and concludes by presenting the impact of the CRA to reduce solid waste risk.

Chapter Six discusses the findings with reference to prevailing literature around disaster risk and participatory research, followed by recommendations for further research and methodological adjustments. The conclusion is presented in Chapter Seven.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The past two decades have been characterised by significant shifts in thinking in relation to disasters and risks and their interface with development conditions. Parallel with these progressions in thought is an increasing emphasis on participatory approaches in both community risk management practice and risk-related research.

Chapter Two explores this progression of thought and the interface between disasters and development, as well as the role of community-based research processes. It begins by revisiting the evolution of thinking on disaster risk over the past century, describing concepts and frameworks central to the discourse, then examines participatory development and research approaches and their origins in developmental theory. It goes on to compare the strengths and limitations of participatory and social science research methods in understanding disaster risks and concludes by interrogating community risk assessment methods commonly used in urban risk settings.

2.2 Evolution of Disaster Risk Discourse

2.2.1 Paradigm Changes in the Field

Over the past century, understanding of the disaster risk domain has been marked by several significant paradigm shifts, which increasingly profile the importance of vulnerability rather than natural hazards as the driver of loss. It has also come to emphasise disaster 'risk' rather than disaster events, as explained by Smith and Petley (2009), who identify four distinct phases in its evolution:

- Pre 1950s: 'engineering' paradigm
- 1950s and 1960s: dominant 'behavioural' paradigm
- 1970s: radical 'structuralist' paradigm
- 1990s to date: emergence of a 'complexity' paradigm

Before 1950, disasters were viewed as 'acts of God', external and irreversible events (Smith, 2004) where the focus was on the magnitude and frequency of hazards. The 'engineering' paradigm during this period argued that disasters could be averted by either moving people away from hazardous locations or controlling hazards with engineering, for example by building dams or designing earthquake resistant buildings.

The belief that hazards were mainly responsible for disasters came under increasing scrutiny in the 1950s with the emergence of the 'behavioural' paradigm (White, 1936, 1945 in Smith, 2004; Blaikie *et al*., 1994). Gilbert White is recognised for his assertion that hazards were not completely external to society, but connected to decisions people made regarding where they settled and how they developed (Smith, 2004). However, he continued to advocate that disasters were extreme events caused by natural hazards and separate from ordinary existence. This reinforced the perception that disasters could not be prevented and should be controlled by technological solutions (Mercer *et al*.,

2008; Smith, 2004). The behavioural paradigm continued to be expressed into the 1960s, with research increasingly recognising that human dimensions played an important role in disaster risk (Tobin and Monty, 1997).

Although there was an increased awareness in the early 1970s that disasters were not solely a product of hazards (Westgate *et al*., 1976 in Quarantelli and Dynes, 1977), research focused on post-disaster delivery and hazard prediction (Quarantelli and Dynes, 1977). While this led to an emphasis on technological solutions to reduce risk (White and Haas, 1975 in Burton *et al*., 1978; Tierney, 2006), there was an increasing awareness that technology could also increase disaster losses (White, 1974; Burton *et al*., 1978). For example, in 1957, it was calculated in the US that the net effect of 20 years of federal investment in flood-related control measures (dams, channel improvements and levees) actually increased the total national losses from floods (White, 1974).

This resulted in more emphasis on 'non-infrastructural' aspects of risk (Smith and Tobin, 1979), resulting in the emergence of a radical 'structuralist', or 'development' paradigm in the late 1970s. Largely driven by political ecologists, this approach viewed disasters less as natural or the product of hazards but rather as functions of socio-economic, political and historical processes (Blaikie *et al*., 1994; Cuny, 1983; Hewitt, 1983 in Quarantelli, 1994; Lewis, 1999; Maskrey, 1989; Varley, 1994; Mercer *et al*., 2008). For instance, Blaikie *et al*. (1994) contended that society creates the conditions that result in people facing hazards differently and that this affects their vulnerability towards them. Therefore what is required is a re-distribution of wealth and power, which would favour reliance on local knowledge rather than on imported technology (Smith, 2004).

By the 1990s, a 'complexity' paradigm emerged, which linked political ecology with the hazard paradigm, highlighting complicated interactions between nature and society (Smith and Petley, 2009). There was also a move from an emergency response to a more multi-disciplinary and developmental approach (Warner *et al*., 2002 in Holloway, 2009).

2.2.2 Core Concepts in the Disaster Risk Domain

Although the United Nations' International Strategy for Disaster Reduction (ISDR) (2009) provides widely used disaster risk terminology, there is no consistency in its interpretation due to the multi-disciplinary nature of the discourse (Benson and Twigg, 2004). However, this section introduces concepts central to the discourse, along with challenges in their application. While this wide-ranging field applies numerous concepts, emphasis is placed on the concepts of disaster, hazard and vulnerability.

Disasters are popularly defined (and perceived) as large events (Tobin and Monty, 1997) that grab the news headlines. For instance, in 2010 the media widely reported on events in Haiti, the Gulf of Mexico Gulf and Pakistan. The ISDR (2009: 9) defines 'disaster' as, "*a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources*". However, what constitutes a disaster varies from place to place and also depends on the capacity of the society affected to deal with it (Hewitt, 1997). Similarly, the concept of disaster can be applied at multiple scales (*ibid*) and can include relatively small-scale events whose cumulative impact can cause more death and destruction than large-scale events (Hardoy *et al*., 2001 in Pelling, 2003; Smith, 20004; Twigg, 2004). An

example of this occurred in Guatemala between 1988 and 1998 (excluding Hurricane Mitch) when there were 1,666 disaster events reported, leading to 1,393 deaths and affecting 395,961 people. However, during the same period (including Hurricane Mitch) the international disaster database, EM-DAT recorded only 19 "global" disasters, which resulted in 859 deaths and affected 192,830 people (Gelllert, 1999 and EM-DAT, in Twigg, 2004).

Pelling (2003) also argues that this standard conceptualisation of disaster needs to be broadened to include chronic events rooted in everyday hazards. Furthermore, Satterthwaite (2007) contends that this focus on large-scale events has resulted in authorities failing to notice the links between everyday chronic risks and disasters. Although there are differences between these conceptualisations, they can be broadly defined as falling within two domains of risks, 'chronic' and 'extreme' (Hewitt, 1997).

Urban risk scholars such as Pelling (2003) and Satterthwaite (2007) emphasise the link between development and disaster on a local scale. They argue that when a community experiences a disaster, it exposes the weaknesses and unsustainability of development in that society. They also emphasise that development can only be sustainable if it can withstand the impact of shocks.

While the ISDR's current definition of disaster does not profile the relative contribution of external shocks and stresses as co-generators of disaster loss, **hazard** is a core concept in the disaster discourse and has been the focus of numerous studies. Noteworthy publications by White (1974), Burton *et al*. (1978), Hewitt (1997) and Smith (2004) have emphasised the role natural and human-induced hazards play in driving disaster events. For instance, White defined an 'extreme event' as "*any event in a geophysical system displaying relatively high variance from the mean*" (White, 1974: 4). However, the occurrence of an extreme event is not a disaster (Abramovitz, 2001) and does not necessarily become a hazard. In fact, many ecosystems are adapted to natural disturbances, and need extreme events to maintain their health. For example, wildfire burns vegetation to release seeds (*ibid*).

Natural systems are neutral (Burton *et al*., 1978) and extremes of natural system events that do not affect human society are not hazards (Tobin and Monty, 1997). In fact, hazards result only when human society interacts with the environment (White, 1974; Burton *et al*., 1978; Smith and Tobin, 1979). This interaction is closely related to human use of resources (Tobin and Monty, 1997). An example would be a farmer who occupies a flood-plain (White, 1974) or an urban migrant worker who lives on a steep slope in an informal settlement that is near his place of work. In fact, an extreme event can even be a resource and a hazard simultaneously, such as a flood that destroys a farm and at the same time fertilises a field (Burton *et al*., 1978).

These natural extremes are not only natural but are necessary. However, sometimes they are exacerbated by efforts to suppress them (White, 1974). For example, if rivers are contained, they may increase the flow-rate, causing worse flooding down-stream (Abramovitz, 2001). A society that disrupts, overexploits, or degrades nature reduces its ability to protect people (*ibid*) and can also increase the frequency and severity of hazards (Smith and Petley, 2009). These actions are called 'hazard drivers' (ISDR, 2009), an example being urbanisation that exacerbates flooding (Tobin and Monty, 1997). Lavell (2005) describes how hazards can also change or concatenate, such as floods that mix with solid waste to create water-borne diseases.

This progression in thought led authors such as Pelling (2003) and Smith (2004) to argue that such 'natural' hazards are so heavily influenced by societal action that it is hard to separate the human from the natural causes, so they should therefore be regarded as 'environmental' hazards. They recognise, however, that while some hazards are more natural (earthquakes and volcanoes), others, such as floods, are more man-made.

Contemporary studies of disaster events not only profile the role of hazard processes in driving loss, they have also contributed to the understanding of **vulnerability**. Many authors (Blaikie *et al*., 2004; Cuny, 1983; Garćia-Acosta, 2002; O'Keefe *et al*., 1976 in Varley, 1994) argue that disasters have become more frequent, and losses have increased over time not because there are more hazards but because vulnerability to hazards has increased. Moreover, disasters expose the vulnerability and lack of resilience in a society and the failure of development (Cuny, 1983; Blaikie *et al*., 1994; Hewitt, 1997; Kohler *et al*., 2004; Adger, 2006; Cannon, 2008).

In many societies, vulnerability is not distributed evenly. Often the poor are more vulnerable to hazards (Cuny, 1983; Wisner *et al*., 2004). However, this is too simplistic a view as people's vulnerability is also affected by other factors such as health, age, ethnicity, religion, gender, disability and immigration status (Wisner *et al*., 2004).

Vulnerability is sometimes defined negatively as in "*the susceptibility to be harmed and the inability to cope, resist or recover*" (Adger, 2006: 269), or, "*characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard*" (ISDR, 2009: 30). These perspectives of vulnerability stress people's weaknesses and limitations (Wisner *et al*., 2004). However, this position has been supplemented by the concept of 'capacity' (*ibid*), which has led to definitions that emphasise that vulnerability is more than survival of a disaster. For example, "*Vulnerability is due to the exposure and sensitivity of that system to hazardous conditions, and the ability of the system to cope, adapt or recover from the effects of those conditions*" (Smit and Wandel, 2006: 286).

Our understanding of vulnerability has also been strengthened by advances in thinking from other domains. For example, entitlement theory (Sen, 1981, 1984) highlighted the role that social, economic and political factors play in causing food insecurity, and political ecology has raised the importance of vulnerability to disasters (Adger, 2006). Additionally, the Sustainable Livelihoods Approach has contributed to research in vulnerability, adaptation and resilience (Pelling, 2003; Adger, 2006).

Just as the concept of 'vulnerability' rose to prominence during the 1990s, **resilience** has become the buzzword of the 2000s (Manyena, 2006b). Defining resilience remains a contested issue due to the multidisciplinary nature of the concept and because it overlaps with other concepts, such as vulnerability, capacity, resistance and adaptation (Manyena, 2006a; Twigg, 2007). However, most definitions categorise resilience into three components: *"the capacity to resist or absorb a hazard so it does not become a disaster; to cope or maintain basic functions and structures during disaster events; and the ability to 'bounce back' to an acceptable level following a disaster event as quickly as possible"* (Manyena, 2006a; Tierney, 2006; Davis and Izadkhah, 2006; Adger, 2006; ISDR, 2009; Twigg, 2007).

Some view disaster vulnerability and resilience as separate entities (Benjamin, 2008 quoting Manyena, 2006), while others consider them to be factors of each other (Twigg, 2007). For example, Adger (2006) argues that because they share common factors, the points of convergence are more numerous than the points of divergence. However, a fundamental difference between the concepts is that vulnerability focuses on what is missing, while resilience seeks to build upon what is already in place, such as resources and adaptive capacities (O'Brien *et al*., 2006). However, Lewis and Kelman (2010) argue that resilience does not address the root causes of disaster risk and there should be a greater emphasis on reducing vulnerability.

The progression in thought from an exclusive focus on hazards to vulnerability and resilience processes has been paralleled by shifts in thinking from a primary focus on disaster events to increasing attention to the process of disaster risks. Current thinking views disaster risk as the future probability of loss or damage determined by the frequency and magnitude of a specific hazard combining at a specific time and place with elements vulnerable to the hazard (ISDR, 2009; Wisner *et al*., 2004; Alexander, 2000; O'Brien *et al*., 2006; Kohler *et al*., 2004). Therefore, disaster risk can also be defined as "*the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period*" (ISDR, 2009: 9). It is often portrayed as:

$$\text{Disaster Risk} = \frac{\text{Hazard x Vulnerability x Elements at risk}}{\text{Capacity}}$$

The concepts discussed in this section have been cumulatively understood using different frameworks and are discussed in the following section.

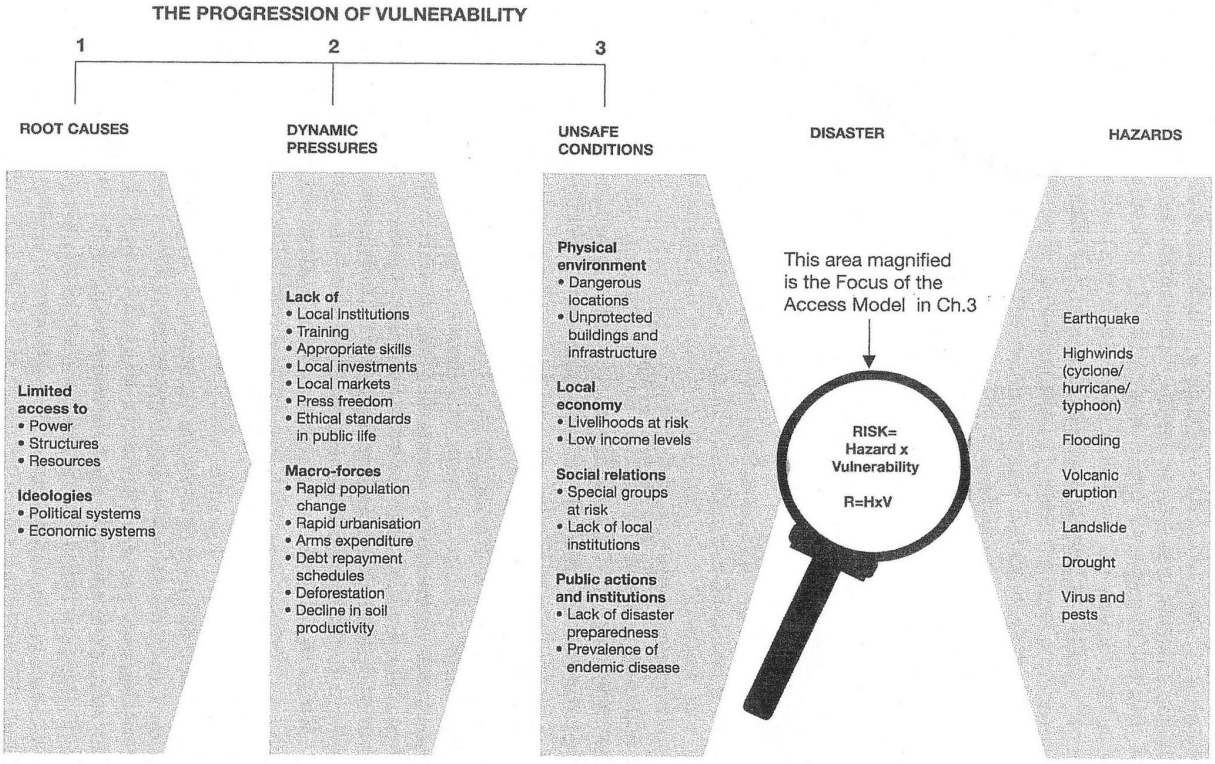
2.2.3 Widely Used Frameworks for Interpreting Disaster Risk

Core concepts in the disaster risk discourse, such as hazard, vulnerability and risk, have been conceptualised and combined in different ways over recent years. Noteworthy models include the Pressure and Release Model (Blaike *et al*., 1994), the Model of Vulnerability (Pelling, 2003), the Sustainable Livelihoods Approach (SLA), the Capacities and Vulnerabilities Analysis (Anderson and Woodrow, 1998) and the Hyogo Framework for Action (ISDR, 2005). This section provides an overview of each of these frameworks.

The Pressure and Release Model (PAR), later referred to as the Pressure Model (Wisner *et al*., 2007), illustrated in Figure 2.1, was conceptualised and developed by political ecologists Blaikie *et al*. (1994). It views disasters as the intersection between two opposing forces; hazard, and forces that create vulnerability and physical exposure of an 'element at risk' (people/infrastructure/ livelihoods) to the hazard. Vulnerability is traced through the 'progression of vulnerability' from root causes via dynamic pressures leading to unsafe conditions.

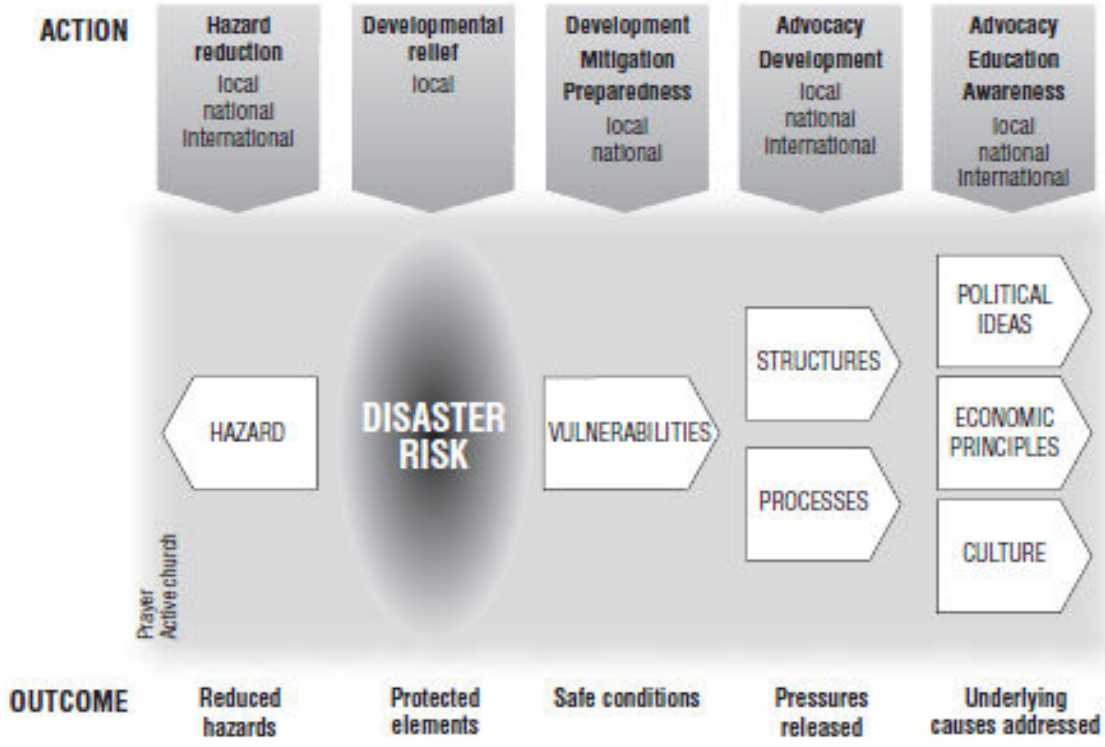
Building upon the Pressure and Release Model, ten years later, Wisner *et al*., (2004) developed the Release Model (Figure 2.2). They argued that, by addressing the factors listed in the PAR, disaster risk can be reduced. For example, 'unsafe conditions' can be reversed to 'safe' conditions' by building hazards resistant infrastructure. Wisner *et al*. contend that while there has been progress in addressing unsafe conditions, less has been done to reverse dynamic pressures and improve governance, which they regard as the most important factors in reducing disaster risk.

Figure 2.1 Pressure and Release Model (PAR)



Wisner *et al*. (2004: 51)

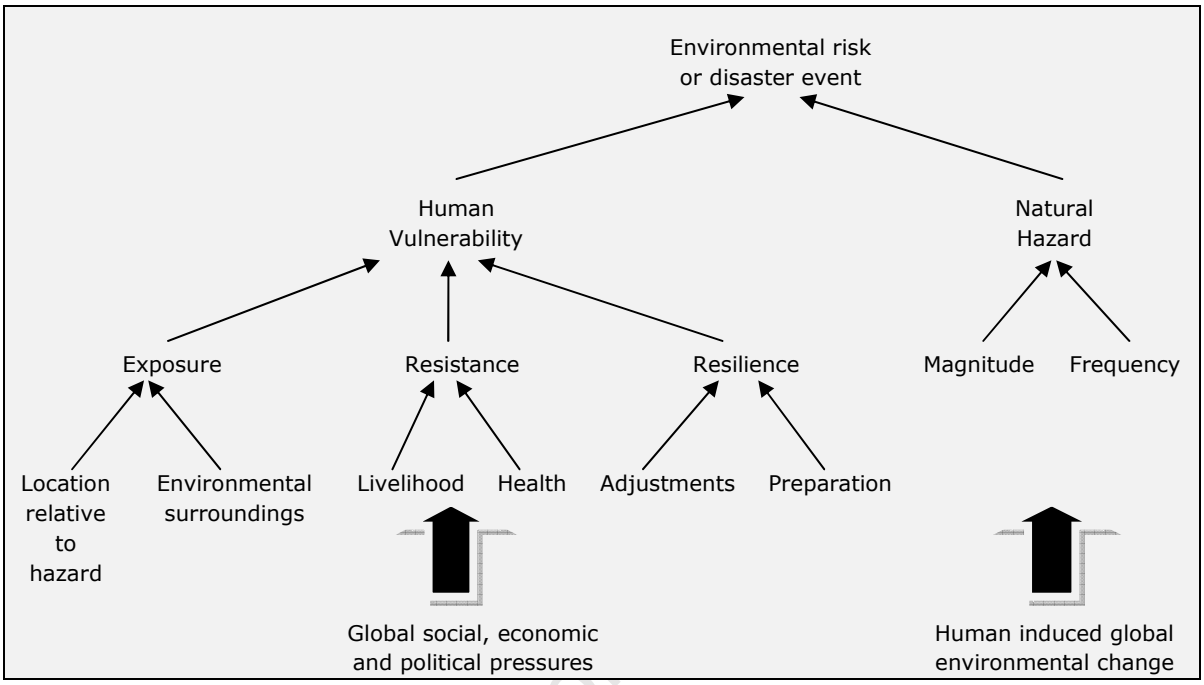
Figure 2.2 The Release of 'Pressures' to Reduce Disasters



Venton and Hansford (2006: 18)

Pelling advanced the work of Blaikie *et al*. by incorporating people's resistance and resilience in his Model of Vulnerability, as shown in Figure 2.2. This approach sought to address an unbalanced emphasis on exposure which can result in a misleading and dangerous focus on physical hazard defence, rather than on strengthening resistance and resilience.

Figure 2.3 Model of Vulnerability



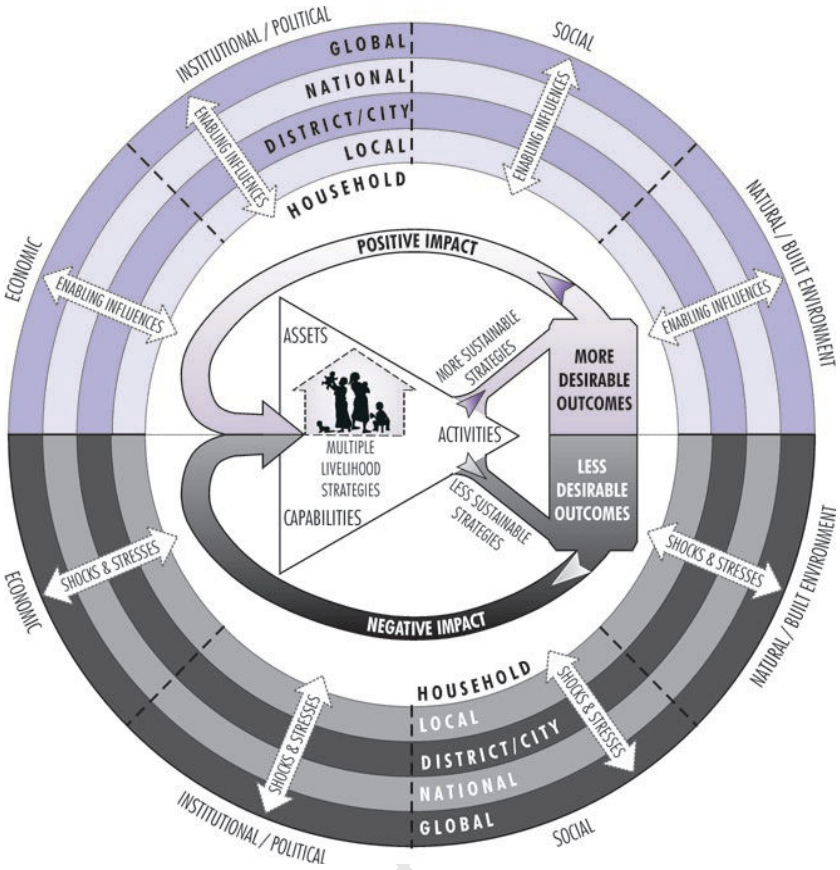
Pelling (2003)

A useful developmental approach to the understanding of disaster risks has been provided by the Sustainable Livelihoods Approach (SLA). This conceptualisation places emphasis on the household's resources rather than on the community. It looks at the interaction between people, their capabilities, assets and the resources to which they have access, as well as activities they engage in to secure a livelihood (de Satgé *et al*., 2002).

Furthermore, it recognises that households mobilise different assets and are exposed to different shocks and stresses. For example, a central premise of the SLA is the focus on five core assets groups or capitals. These include human capital (education, skills, knowledge, health, ability to work), social capital (networks and connectedness, membership of formalised groups, trust and exchange between families and networks, and support from religious and informal organisations), natural capital (land and natural resources), physical capital (tools, equipments, shelter, infrastructure), and financial capital (assets and entitlements with cash value) (de Satgé *et al*., 2002; DFID, n.d.).

A number of different SLAs have been developed by organisations such the United Kingdom's Department for International Development (DFID) and Oxfam. Figure 2.3 provides an example by de Satgé *et al*. (2002) which applies to Southern Africa. It illustrates the connection between household assets, capabilities and activities and the impact of outside influences on households' livelihood strategies. The diagram shows how household assets, capabilities and activities translate into more (or less) sustainable livelihood strategies that affect livelihood outcomes.

Figure 2.4 Sustainable Livelihoods Framework



de Satgé *et al*. (2002: 65)

While the PAR and SLA approaches provide explanatory insights into vulnerability and risk, other 'action-orientated' frameworks have been widely used in recent years. One of the earliest of these, which recognised the importance of capacities as well as vulnerabilities, was Capacities and Vulnerabilities Analysis (CVA) (Anderson and Woodrow, 1998). This approach was designed for the post-disaster phase in order to make relief interventions more developmental by decreasing future disaster risk. It has also been used in mitigation and planning to support development and many variations of participatory risk assessment methodology are based upon this framework (Benson and Twigg, 2008).

The CVA mirrors the SLA in that it gives equal weight to vulnerabilities and capacities. Moreover, it is based upon three categories and their assets, which are similar to SLA capitals: physical/material (resources, skills and hazards: land, climate, health, skills, labour, infrastructure, technologies), social/organisational (relations and organisation among people: formal and informal systems), and motivational/attitudinal (community's view of its ability to create change: beliefs, ideologies, sense of empowerment).

Cannon *et al*., (n.d.) contend that, overall, CVA is a robust tool for data-gathering at project or community level for vulnerability, capacity and livelihoods analysis. However, they argue that there are challenges in applying it. For instance, it is difficult to identify appropriate interventions if analysis is incomplete, and also the framework is ineffective in analysing vulnerability. It is also only successful when there is active community participation, which takes time and may not fit within donors' time frames (*ibid*).

On a global scale specifically, the Hyogo Framework for Action (HFA) (ISDR, 2005) has significantly shaped approaches to disaster risk. Adopted in 2005 at the World Conference on Disaster Reduction in Japan, the HFA has led to 168 governments committing to a 10-year plan to build resilience of nations and communities against disasters. It sought to achieve this by more effectively integrating risk reduction measures into development at all levels, strengthening institutions and capacities, particularly at the community level, and integrating risk reduction approaches into preparedness and recovery programmes. Relevant to this thesis, the HFA's 'priorities for action' specify the identification, assessment and monitoring of disaster risks (ISDR, 2009). Although the HFA acknowledges the role of community participation, as Wisner and Walker (2002 in Venton, 2009: 47) point out, "*The tone throughout this section is very much a top down one. The emphasis is on the expert creation of knowledge. No mention is made of the importance of community knowledge and or understanding community perceptions of risk and disaster*".

While the HFA represents the prevailing global approach for addressing disaster risk, it is only one of many frameworks that have evolved, some of which have been discussed here. They have attempted to address the complexity of the disaster risk domain so as to guide action by multiple stakeholders in order to reduce risk at multiple scales.

2.3 Participatory Development: Evolution and Approaches

2.3.1 Evolution of Participatory Development

The origin of more participatory frameworks, now widely used for risk assessments, is one outcome of the evolution of participatory development in recent years. For instance, over the past century approaches to social and economic development have shifted significantly. During the 1950s and 1960s development approaches were considerably influenced by the 'positivistic' paradigm. This emphasised a belief in neutral observation and foundation of knowledge; a value-free ideal of scientific knowledge; and a belief in the methodological unity of the sciences (Fay, 1988 in Wetmore and Theron, 1998; Mouton, 1996).

This period was also informed by modernisation and dependency theories (Burkey, 1993; Theron and Wetmore, 2009). For example, following the Second World War and the success of the Marshall Plan in Europe, 'modernisation' was an attempt by Western governments, partly as a response to the perceived spread of communism, to develop less developed nations (Roodt, 1996). It was argued that development would be achieved by increasing the Gross National Product (GNP) per capita through pursuing economic growth, primarily via urban industrial development (Roodt, 1996). It was also characterised by a 'top-down' approach to implementation, which was expected to facilitate economic growth that would 'trickle downwards' (Roodt, 1996; Todaro and Smith, 2009).

However, despite many developing countries reaching economic growth targets, rates of poverty, unemployment and marginalisation continued to increase (Burkey, 1993; Todaro and Smith, 2009). This resulted in a shift from macro-theories of modernisation and dependency toward a humanist paradigm of development, focused on people and community (Jeppe, 1990).

Similarly, in the 1970s, Paulo Freire (1972) proposed 'conscientisation', via a process of self-actualisation. He argued that when people are made aware of the contradiction between their materially poor lives in contrast to the elite classes, they would change from passive to active subjects and challenge dominant political elites via organisation or 'popular participation' (Roodt, 1996; Wetmore and Theron, 1998).

A further reaction to modernisation, and the failure of many African states to bring about sustainable development, was reflected in the emergence of 'people-centred development' in the 1980s (Korten, 1990; Roodt, 1996). Drawn from conscientisation and humanism, it emphasised participation by the community, especially women, youth and the illiterate. It was also based upon an international movement which moved away from centralised government towards local democratisation, and, as expressed by Coetzee (1989), should be "for people by people".

Thus, by the 1990s, contemporary views of development had shifted towards prioritising participation, making it a 'mainstream concern' (Francis, 2001). It combined the concepts of 'participation', based upon a partnership between the external change agent and the people themselves (Wetmore and Theron, 1998), and 'development', which promotes self-reliance and empowerment (*ibid*). In this conceptualisation, participatory development is regarded as both a means and an end, an end because it may result in successful outcomes, and a means because it is viewed not as a once-off activity but a continuous learning process leading to self-reliance (Korten, 1990; Wetmore and Theron, 1998).

2.3.2 Participation: an Integral Element of Contemporary Development

The right to participation is enshrined in Article 27 of the Universal Declaration of Human Rights (UN, 1948). The concept of 'participation' has become increasingly used over recent years, to the extent that Henkel and Stirrat (2001) contend that it is hard to find development projects or programmes that do not make mention of participatory approaches, bottom-up planning and empowerment.

However, it is difficult to define participation in a single statement because it embraces a spectrum of meanings (Brock and Petit, 2007). For example, Roodt (1996: 312) defines participation as "*people involving themselves, to a great or lesser degree, in organisations indirectly or directly concerned with the decision-making about, and implementation of, development*". However Davids *et al*. (2009) argue that participation acts more as an umbrella concept for intervention, facilitation and enablement.

A recurrent theme in the discussion of participation is the inclusion of poor and marginalised people in their own social and economic development, especially those who had previously been excluded from top-down implementation (Guijt and Shah, 1998; Kothari, 2001).

There are a number of arguments for the use of a participatory approach. For example, Chambers (1994: 961 in Cooke, 2001: 103) claims that, "*Participation leads to better planning, implementation, monitoring, evaluation, investigation, training and action*". Additionally, Abarquez and Murshed (2004) state that community participation is essential because no one understands their opportunities and constraints more, and no one is more interested in people's wellbeing than the community itself. Furthermore,

Pretty *et al*., (1995) argue that success comes when people's knowledge is valued and they are able to make decisions independently of external change agents.

There are examples where participatory approaches have enhanced the competence and organisational capacity of disadvantaged and marginalised groups (Kohler *et al*., 2004). For instance, the World Bank discovered that only when projects are participatory are reforms undertaken in a serious and sustainable manner (Todaro and Smith, 2009). Moreover, Weiner *et al*. (n.d.) contend that planners pay particular attention to public participation because community input is viewed as critical for defining local issues.

However, Rahnema (2010) argues that the notion of participation has been widely and variously interpreted and even misused. For example, according to Deshler and Sock (1985), while authorities and change agents may superficially promote and seek people's agreement and support, they may also fear that genuine participation is not in their interests. Similarly, Pretty *et al*. (1995) suggest that too much involvement is less controllable, less precise and more likely to slow down planning and implementation. This means that change agents may use the term 'participation' to justify external decisions and control. Rahnema (1992 in Pretty *et al*., 1995) also suggests that participants are often 'dragged' into participating in a project in which they have no interest.

Even NGOs are criticised for misusing participatory methods. This is especially the case when a participatory approach is seen to be increasing efficiency rather than fostering transformative benefits of genuine participation (Todaro and Smith, 2009). As an example of this, the administrative competence of participants is a less visible outcome than, the number of toilets constructed (*ibid*).

Weiner *et al*. (n.d.) warn that if participation is just a "show exercise", it may lead to distrust and inappropriate action. Similarly, Kemp (2008) notes that some view participation as just another form of oppression, which may maintain power structures and can actually hinder the independence of marginalised people.

2.4 Social Science Research Approaches: Traditional and Participatory Methods Compared

2.4.1 Overview

The increasing use of participatory approaches in development planning has been paralleled by its growing application in social science research. As this study seeks to examine community risks by applying and comparing traditional and participatory approaches, it will explore their respective strengths and limitations.

2.4.2 Traditional Social Science Research

A diverse collection of 'non-participatory' social science research methods has evolved to build explanatory theory regarding people and their behaviour (Punch, 1998). Classified as 'basic' and 'applied', 'basic' research is orientated towards problems located within scientific disciplines without requiring a practical result (Neale and Liebert, 1986). In contrast, 'applied' research aims more at solving problems, usually in relation to a field such as education or public health (*ibid*; Punch, 1998). 'Non-participatory' research is also termed 'social science' or 'extractive' research. However, for the purpose of this study, it will be referred to as "traditional research".

Although positivism is difficult to define (Punch, 1998), it is based upon the belief that "*objective accounts of the world can be given*" (*ibid*: 28). This objectivity assumes that social and natural worlds are similar enough to use the same general principles and methodology (Mouton, 1996). Employing methods like those used in biomedical disciplines, traditional research tends toward quantitative, (with an increasing application of qualitative), methodologies such as surveys and observations, objectivity being understood as the neutral attitude of the outsider (Mouton, 1996; Vermont, 2009; Labovitz and Hagedorn, 1971; Punch, 1998).

However, despite assurances that objectively executed social science methods yield robust results, some scholars are more cautious. For instance, Wetmore and Theron (1998) argue that because everyone creates his/her own social reality, observations can never be value-free. They claim that people cannot be analysed according to a neutral universal methodology. Similarly, Mercer *et al*. (2008) suggest that traditional research, led by outsiders, is, in many cases, not conducive to understanding the locality and situation as a whole.

The application of traditional research methods also assumes that the researcher has superior status to the subject due to his/her education and training, which confers control of the research to him/her. (Greenwood and Levin, 2007). This implies that subjects are incapable of participating as equals (Burkey, 1993) and reduces research 'subjects' to 'objects' (Whyte *et al*., 1991). Additionally, stakeholders are not involved in the selection of topics, data gathering techniques and the interpretation or presentation of results. The researcher extracts the data and 'owns' the results, and neither expects to share the results with the stakeholders nor assumes they would be interested in or understand them (Greenwood and Levin, 2007).

This can cause participants to feel used or exploited (Chambers, 1994; Mercer *et al*., 2008) and, according to Burkey (1993), maintains people's economic and intellectual dependence on external elites. Methodologically, Chambers (2007: 179) states that questionnaire surveys are "*laborious, expensive, insensitive to local knowledge, inaccurate, slow to process and often misleading or inconclusive*".

2.5 Participatory Research

2.5.1 Participatory Research: Emergence and Widely Used Approaches

Prior to the 1960s, social science research approaches were dominated by positivism (Mouton, 1996). However, consistent with changes in the broader development agendas, social science research increasingly moved towards participatory approaches based on humanism, conscientisation and sensitisation (learning) (Wetmore and Theron, 1998). These approaches explicitly view people as active creative beings rather than passive objects (Hall *et al*., 1982 in Mouton, 1996).

This shift in research emphasis was due in part to the failure of top-down development based on neutral observation (Cooke and Kothari, 2001; Mercer *et al*., 2008; Kohler *et al*., 2004). Academics and practitioners also realised that local people were integral to the process of learning (Wetmore and Theron, 1998) and that participatory social science research could enhance the competence and organisational capacity of disadvantaged and marginalised groups (Kohler *et al*., 2004). Over the last two decades, this has been reflected in the emergence of numerous participatory approaches.

2.5.2 Features of Participatory Approaches

A number of methodologies have contributed to participatory research, for example, Participatory Action Research, Rapid Rural Appraisal and Participatory Learning and Action (PLA). One methodology that has been particularly influential has been Robert Chambers' work on participatory rural appraisal (PRA) (Kapoor, 2002; Francis, 2001). However, because there is confusion about these different methodologies (Abarquez and Murshed, 2004; Chambers, 1997; de Dios, n.d.; Mercer *et al*., 2008; Pretty *et al*., 1995; Brock, 2003), for the purpose of this study, they will be referred to as PLA or participatory research.

Chambers (1994a: 953 in Francis, 2001) considers PLA as "*a family of approaches and methods to enable rural people to share, enhance, and analyse their knowledge of life and conditions, to plan and to act*", the aim of which is to enable local people and communities to take control over their own development (Kapoor, 2002). Two recurrent elements of PLA are 'participation' and 'role reversal' (Chambers, 1997; Kohler *et al*., 2004; Kapoor, 2002). Participation means that all members of the community can become involved regardless of their education, particularly the marginalised, and that they are recognised as capable and creative and treated as partners in development (von Kotze and Holloway, 1996). Role reversal, often referred to as "handing over the stick", occurs when the outsider gives up his/her traditional role of expert extractive researcher and becomes the facilitator, who listens and learns, thus enabling local people to take on roles of analysing, planning, monitoring and evaluation (Chambers, 1997; Kohler *et al*., 2004).

This is achieved largely by combining oral, written and visual exercises, with a strong emphasis on group-based learning activities and visual representations of reality (Henkel and Stirrat, 2001). Popular tools used include mapping and modelling, time-lines, seasonal calendars, Venn diagrams, matrix scoring and ranking and participatory planning, budgeting, implementation and monitoring (Chambers, 1997). Visual methods in particular are used to empower illiterate, disadvantaged people (Francis, 2001).

A further characteristic feature is an explicit emphasis on the researcher's attitude and value set. Two core values are 'self-critical awareness', where facilitators constantly examine their own behaviour, and 'personal responsibility', where they rely on their own judgement rather than on a manual (Francis, 2001). Therefore, Francis (*ibid*) argues that trainees in PLA should spend as much time learning communication skills and transforming attitudes as they do on mastering learning techniques.

2.5.3 Differences Between Traditional and Participatory Research Methodologies

In addition to these recurrent themes, there are some fundamental characteristics that differentiate participatory and traditional approaches. These include differences around theory, neutrality, and control of the research. Traditional researchers, for example, would argue that methodology is paramount (Punch, 1998). However, participatory researchers take a more pragmatic approach, focusing on the subject and fitting methods around that (Chambers, 1993 in Allen, 2003). Advocates of this approach justify participatory research theoretically and methodologically. For example, Chambers, (1993) Wetmore and Theron (1998), among others, argue that, according to the dialogical construction of social reality, development should be based upon the three

foundations of method, behaviour/attitude and sharing. As Chambers (1983) contends, development is not always compatible with theory, but should be concerned with reality, defined by the local 'expert' rather than by social scientists.

Additionally, PLA is meant to facilitate the participation of local people by giving them the means to analyse their own problems (Henkel and Stirrat, 2001), whereas traditional research is analysed by external researchers (Francis, 2001).

Francis (2001) states that PLA is often presented as a paradigm of reversals compared with traditional research. According to Chambers (1994 in Francis, 2001), it values local knowledge over researcher's knowledge, the individual over the group, visual over verbal, comparing difference over absolute measuring, from frustration to fun, empowering instead of extraction, bottom-up rather than top-down, diversity rather than standardisation, and learning rather than a blueprint.

2.5.4 PLA: Strengths and Critiques

PLA has shown to have a number of benefits. For example, some authors (Brock, 2003; Pain and Francis, 2003 in Mercer *et al*., 2008) contend that PLA is more effective than traditional research in seeking out and conducting research involving vulnerable and marginalised people. In addition, PLA has also shown itself to be an adaptable methodology. Kohler *et al*. (2004), for instance, argue that the emphasis is on 'participatory', rather than 'rapid', allowing the method to be used in urban as well rural settings. This could possibly explain why, according to Kapoor (2002), it appeals to organisations which emphasise programme delivery.

Due to PLA's adaptability, it has been used to answer many questions and has uncovered unexpected realities (Neefjes, 2003), producing knowledge that is reliable and relevant. For instance, data are viewed as particularly rich compared with those collected via other methods (Cooke, 2001) and are less likely to be false (Maruyama, 1981 in Mouton, 1996). Moreover, it has been shown to provide powerful problem-solving tools that assist in producing more relevant and sustainable solutions for local people (Mercer *et al*., 2008; Maruyama, 1981 in Mouton, 1996; Kothari, 2001).

Regarding the value of visual methods, Jupp (2007) found that the use of picture stories during an investigation of human rights abuses in Bangladesh won the trust of participants, and enabled third parties (village leaders, police and lawyers) to talk more openly. Additionally, in a baseline survey conducted with commercial sex workers, also in Bangladesh, Jupp also discovered that by using pictures "*as long as individuals' privacy was maintained, there seemed no end to the possibilities of exploring issues*" (Jupp, 2007: 113).

The knowledge generated from PLA methods has also been used to challenge external actors' belief that 'they know best' (Datta, 2003). As an example, Cornwall (2003), while working in rural Zimbabwe, found that external extension workers were amazed that they were able to 'learn something new' from illiterate local people. PLA has also been found to bring communities together by considering all opinions (Mercer *et al*., 2008) and sharing results through community meetings (Brock, 2003).

For many, PLA is empowering, making power reversals real (Chambers, 1994, 1997; Cooke, 2001; Kothari, 2001) because it stresses the proactive role of those affected (Kohler *et al*., 2004). In this context, empowerment is viewed as people being involved

in their own development by participating in analysis, planning and action (Chambers, 1997). Empowerment also relates to 'power to' and 'power from within'. It is more than bringing people into the decision-making process (power to) as it also refers to processes that lead to people perceiving themselves as able and entitled to take ownership of the decision-making process (power from within) (Davids, 2009). As examples of this, Prasad (2003), working in India, saw that PLA enabled children and women to realise their competence and gain respect from the community and Clemente (2003), working on a council housing estate in London, found that although nothing new was learned, the use of participatory methods created a platform for people to voice their concerns for action with the authorities.

While these views underline the value of PLA, there are several critiques of the participatory approach. These include their theoretical and methodological limitations, as well as the assumptions about community and consensus. For example, theoretically, Kapoor (2002) argues that because PLA emphasises practice over theory (Chambers, 1994), it is insufficiently theorised. Similarly, Greenwood and Levin (2007) claim that it lacks a theoretical position on how to deal with intragroup conflicts that appear during the PLA process.

From a methodological perspective, Pretty *et al*. (1995) contend that participatory methods are undisciplined because of their qualitative and subjective nature. They argue that participatory methods that do not involve triangulation of sources, methods, and checking outputs should be judged untrustworthy. Therefore, as Neefjes (2003) argues, tools need to be semi-standardised to allow cross-checking to ensure trustworthiness and to enable monitoring, evaluation and impact assessment.

Another criticism is that it has become formulaic or routinised, with a tendency to place too much confidence in the automatic application of tools or methods, which are often held up as the defining characteristic of participation (Brock, 2003; Pretty *et al*., 1995, Hailey, 2001; Guyere, 1995). It is argued that this has stifled innovation and flexibility, and has lost the important processes of dialogue, critical reflection, action analysis and change (Greenwood and Levin, 2007; Hailey, 2001; Jupp, 2007; Guijt, 2003; Guyere, 1995; Pretty *et al*., 1995). Clemente (2003), for instance, contends that no matter how motivated facilitators are, after a period of time facilitation becomes mechanical. In addition, Brock and Petit (2007) contend that while information is required for learning, learning occurs during analysis and reflection. Furthermore, Brock (2003) emphasises the function of activities that precede and follow research, which may be forgotten due to the pressures of time and because of the difficulty in measuring learning (Brock and Petit, 2007).

Chambers (1994) and Mercer *et al*. (2008) also maintain that what is more important are not the tools, but the level of engagement with participants and the attitude and behaviour of practitioners. For example, in a study of South Asian NGOs, Hailey, (2001) found that successful NGOs were those that did not rely on formulaic techniques, but spent time talking to people to build trust, respect, and understanding. As Phuyal (2003: 145) states, "*applying PRA tools is not a big deal; the challenge is having the values – a participatory attitude, respecting diversity, giving people choices, facilitating rather than leading and always taking the side of marginalised sections*".

Another critique relates to perceived power relations. Cooke (2001) contends that no matter how much one attempts to 'hand over the stick', the outsider's role is that of an interventionist.

A recurrent criticism of PLA is that it is biased towards viewing communities as harmonious because they use group activities that promote consensus (Goebel, 1998 in Mohan, 2001; Mosse, 1994 in Kothari, 2001). This emphasis on reaching consensus could stem from a common belief that a community is a homogenous and harmonious entity with common values and objectives (Guijt and Shah, 1998; Abarquez and Murshed, 2004), capable of doing anything (Cleaver, 2001; Francis, 2001). The reality, however, is that even within the most homogenous of communities, there is a wide diversity according to gender, age, caste, wealth, ethnicity, religion, language and nationality, as well as knowledge, experience, resources, capacities, beliefs, values and interests (Francis, 2001; Abarquez and Murshed, 2004; Greenwood and Levin, 2007).

According to Greenwood and Levin (2007), these differences can be mobilised to transform the community, or they can cause conflict and exclusion (Abarquez and Murshed, 2004). It is naive, therefore, to expect that by organising a participatory exercise, people will automatically rise above differences and conflicts (Francis, 2001). Francis also suggests that communities are ineffective because the critical units for decision-making and action are individuals, households, and groups, which are often sidelined.

While consensus and participatory approaches explicitly aim to address power inequalities (Greenwood and Levin, 2007; Kothari; 2001), the knowledge they generate is created within power relations (Kothari, 2001). In this context, Greenwood and Levin (2007) contend that consensus-based decision-making creates the potential for coercion. Others argue that it provides the 'official line' rather than differences (Mosse, 1994 in Kothari, 2001), which hides inequalities and discrimination (Guijt and Shah, 1998; Greenwood and Levin, 2007) and creates concealment rather than resolution (Murphy, 1990 in Francis, 2001). Jupp (2007) suggests that such outcomes are unsurprising, as many people's voices are not heard for various reasons such as having less time, the fact that they are shy or that they may distrust outsiders. However, Vermeulen (2005 in Pelling, 2007) claims that this can be addressed by creating space for marginalised populations.

It is not surprising, however, that while not denying that transformation is possible, some authors (Malik, 2003; Mosse, 2001; Greenwood and Levin, 2007) question whether PLA's focus on 'people's knowledge' radically changes existing power structures, and feel that it may be more compatible with top-down planning. Furthermore, Mercer *et al*. (2008) claim that 'understanding' is not enough and that it must be linked to the wider political process in order to ensure sustainability. In addition, because PRA is done quickly, there is not enough time to become aware of the finer distinctions within local power groups (Guijt, 2003; Greenwood and Levin, 2007). Also, because it is short-term it is unlikely to alter power relations significantly (*ibid*).

As with the wider critique of participatory methods, the literature also profiles issues around misuse of PLA approaches. For example, it is assumed that participatory approaches empower local people with the skills to analyse, plan and improve their lives (Guijt and Shah, 1998). However, Jassey (2003) argues that the only participatory thing about PLA is that local people participate in the production of knowledge but they have

little control over what to do with it (Guyere, 1995; Jassey, 2003). This supports the belief that PLA is often conducted merely to give the appearance of participation rather than out of a desire for genuine involvement (Kothari, 2001; Greenwood and Levin, 2007). Similarly, many organisations, such as the World Bank and international NGOs, have been criticised for using PLA for the purpose of extracting information to legitimise a pre-determined agenda (Pelling, 2007; Neefjes, 2003; Greenwood and Levin, 2007; Pelegrina, 2003; Kothari, 2001).

Therefore, while there is increasing and widespread application of participatory methods to support development, these approaches are often merely implemented. This general observation and the limitations of participatory methods also apply to their use in risk assessment processes.

2.6 Risk Assessment and Participatory Risk Assessment

2.6.1 Overview

Risk assessments are conducted in many fields such as health or business continuity planning. However, this chapter focuses on risk assessment methodology in the disaster risk domain. An overview of key aspects of a risk assessment is followed by a focus on participatory risk assessments, which includes their evolution, characteristics and methodological features, and concludes with a critique of their strengths and weaknesses.

2.6.2 Risk Assessment

The ISDR defines risk assessment as, "*a methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend*" (ISDR, 2009: 26). This involves impacts at social, economic and environmental levels and provides the basis for planning and implementing measures to reduce risk (Kohler *et al*., 2004; Jiménez *et al*., 2009). It should also provide the foundation for effective disaster risk management and for integrating with national development strategies to contribute to effective sustainable development (*ibid*). The three aspects of risk analysis are hazard assessment, vulnerability assessment and capacities assessment.

2.6.2.1 Hazard Assessment

Hazard analysis identifies, investigates and documents environmental hazards, their causes and their impact chains (Kohler *et al*., 2004). The three categories of hazard analysis are spatial, temporal, and dimensional, as well as factors that increase hazards. These categories and their characteristics are listed in Table 2.1.

Kohler *et al*. (2004) describe five major tasks of a hazard assessment. These include identifying types of hazards; identifying and characterising hazard-prone locations; calculating the probabilities of occurrence; calculating magnitude; and identifying the factors that influence hazards and also their impact chains, for example, climate change, environmental destruction, resource degradation and major infrastructure.

Table 2.1 Categories and Characteristics of Hazards Analysis

Category of Analysis	Characteristics
Spatial	Location Areal extent
Temporal	Speed/rate of onset Duration Trends/frequency Probability/likelihood of occurrence
Dimensional	Force/magnitude/intensity
Factors that increase hazard characteristics	

(Burton *et al*., 1978; Kohler *et al*., 2004)

2.6.2.2 Vulnerability Assessment

Vulnerability assessment studies the "*ability of a system (or element) to withstand, avoid, neutralise or absorb the impacts of hazardous natural events*" (Kohler *et al*., 2004: 25). However, vulnerability can be identified and analysed only with reference to specific hazards (Kohler *et al*., 2004). The main components of vulnerability assessments are as follows: identifying the elements and characteristics or indicators that identify elements vulnerable to specific hazards ('elements' can refer to people, property, livelihoods, or infrastructure); identifying factors that cause or increase vulnerability to hazards (including human, economic, social, physical, environmental and political factors, which can be far removed, both spatially and temporally, from the state of exposure); and assessing the probability and magnitude of damage/loss.

Research efforts to measure vulnerability are often constrained because vulnerability is dynamic as well as biophysical and social (Alwang *et al*. 2001 in Adger, 2006). In addition, Thomalla *et al*. (2006) argue that the dynamic nature of vulnerability makes predictions of future risk a tenuous proposition.

While standardised approaches to vulnerability emphasise physical vulnerability with regard to buildings or infrastructure, Kohler *et al*. (2004) contend that there is no uniform agreement on how to investigate vulnerability or appropriate indicators for measuring it when it involves social factors. Researchers have attempted to measure social vulnerability (for example, Tapsell *et al*., 2002; Cutter *et al*., 2003). However, Alwang *et al*., (2001 in Adger, 2006) contend that vulnerability should not be reduced to a single metric; in fact doing so reduces its impact and hides its complexity.

2.6.2.3 Capacity Assessment

While work on vulnerability assessment remains uneven, authors note that there is even less emphasis on research involving capacities to reduce risk, and many have argued for an increased emphasis on this (Cannon *et al*., n.d.; Pelling, 2003; Anderson and Woodrow, 1998). Whereas vulnerability focuses on 'needs' and what is missing, capacities analysis seeks to identify existing adaptive capacities in order to build upon and reinforce them, thus increasing resilience.

Although these three components comprise the basis of a risk assessment, they can be conducted using different approaches and methods. These have changed over time, from a very positivistic to an increasing use of participatory methods.

2.6.3 Participatory Risk Assessment

While risk assessment approaches normally incorporate the three complementary dimensions discussed in Section 2.6.2, the complex nature of risks necessitates a wider range of methods and tools. The increasing use of participatory methods and tools over the last 60 years in research and development has also been mirrored in the disaster risk domain. Before the 1940s, disaster risk assessments tended to be conducted by economists, scientists and experts, solutions often being implemented without consulting the local population (Mercer *et al*., 2008; Heijmans and Victoria, n.d.). However, participatory approaches have emerged over the last three decades (Holloway and Roomaney, 2008).

Their importance has been underlined by recent international policy changes that have raised the profile of participatory approaches in national and international development policy planning (Pelling, 2007). For example, the Hyogo World Conference on disaster risk recognised participatory risk assessments as critical in assessing risk at community level (DiMP, 2005). Additionally, at national level, South Africa's Disaster Management Framework states that, "*risk assessment efforts must actively include the participation of vulnerable communities and households*" (RSA, 2005: 31).

2.6.4 Definition and Characteristics of Community-Based Participatory Risk Assessment

A participatory risk assessment is an approach that helps to understand how risks are created and reduced, and it can be applied in urban or rural contexts (Holloway and Roomaney, 2008). Although approaches vary, they share a similar three-stage process:

1. **Preparation Phase**: This involves identifying communities that are most disaster prone *and* most willing to participate which necessitates researching the profile and risk of the community and making logistical arrangements.

2. **Undertaking of field work**: A participatory approach is applied using participatory tools to generate a risk profile of the community (hazards, risks, vulnerabilities, capacities).

3. **Generation of a risk reduction plan**: Production of a plan by the community and external stakeholders in order to reduce disaster risks.

As part of step 2, a wide range of participatory tools are employed. The most commonly used are mapping, ranking, history time-line, transect walk, seasonal calendar, problem tree, Venn diagram and focus groups, as described in Annexure 2.2.

Over recent years, participatory risk assessments have been developed by many organisations, particularly NGOs, as illustrated in Annexure 2.3 (Kohler *et al*., 2004). The multiplicity of titles and approaches reflects the lack of a single definition of a participatory risk assessment (Pelling, 2007).

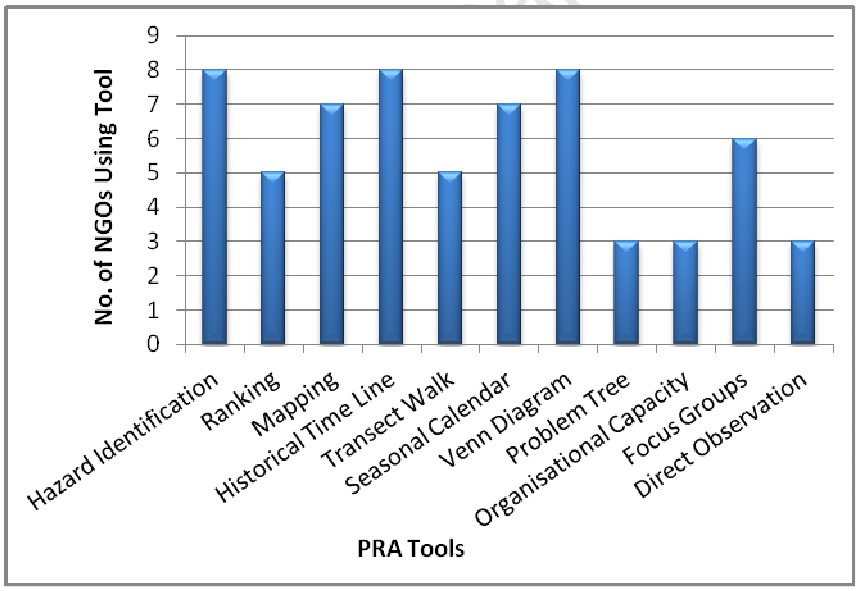
Confusion around participatory approaches, outlined in the previous section, is reflected in methods used in participatory risk assessments, for example, whether they use 'PRA' (Chiwaka and Yates, n.d.) 'PRA/PLA' (Abarquez and Murshed, 2004), 'PRA' or 'PLA' (de Dios, n.d.), or PLA alone (Venton and Hansford, 2006). However, all approaches use participatory techniques which aim to make people the primary target of, and actors in, information generation (Pelling, 2006).

2.6.5 Methodological Features of Participatory Risk Assessment

Figure 2.5 illustrates the participatory tools most commonly used in the methods listed in Annexure 2.3, the most widely employed being hazard identification, ranking, mapping, historical time line, transect walk, seasonal calendar, Venn diagram and focus groups.

In addition to these tools, the same participatory risk assessments also apply other methodologies. For instance, three participatory risk assessments (Abarquez and Murshed, 2004; de Dios, n.d.; Heijmans and Victoria, n.d.) employ Anderson and Woodrow's (1998) VCA, while two others (IFRC, 2007b; Venton and Hansford, 2006) apply the SLA, both of which use similar categories to identify household assets. Additionally, Venton and Hansford (2006) use the Crunch Model and Release Model, based upon Wisner *et al*., (2004) Pressure and Release Model.

Figure 2.5 Most Commonly Used PRA Tools by CRAs



Although literature relating to the use of these tools in participatory risk assessments is sparse, some critiques have been documented. For instance, Korf (2003) found that the ranking exercise required cross-checking, especially if it was started by an influential member of the community. He suggested that this bias could be mitigated by asking the most marginalised people to start the exercise, even although there is a danger that people may still follow 'parrot fashion'. He also suggested applying a secret vote, although this could lead to conflict (*ibid*).

Another widely used tool is mapping. The IFRC (2007b) found mapping to be effective in covering many sectors simultaneously, thereby saving time and enabling communities to analyse inter-relationships between hazards, location, resources etc., in addition to

divergence between different groups. However, they also experienced problems concerning the validity of mapping. For example, conflicts could arise if inequalities become apparent, and there is the problem of possible domination by one person (IFRC, 2007b). The IFRC also reported that conflicts could arise when conducting Venn diagrams within a community which has strong divisions along economic lines, caste, religion, etc. However, they learnt that these could be reduced by working with smaller, more homogenous groups (*ibid*).

Concerning the use of transect walks, van Riet (2009) noted that this revealed considerable information about vulnerability and capacities, but did not produce enough comprehensive data to describe the local context.

Another widely used tool is focus groups. The IFRC (2007b) reported that this could produce differing insights. For example, Venton and Hansford (in Banda Aceh, following the tsunami in 2004) noted that women drew shops, men drew warehouses and children drew playgrounds. This shows that different people apportion different value to different assets (Venton and Hansford, 2006). The IFRC also noted problems in distinguishing between individuals' points of view and the group view.

2.6.6 Community Risk Assessment: Challenges, Strengths and Critiques

Despite a growing knowledge around the strengths, challenges and critiques of participatory risk assessments, there has been little published research, and learning has been somewhat *ad hoc* (Pelling, 2007). For example, Pelling notes that while larger NGOs and humanitarian organisations have learned from existing networks, smaller agencies have often developed independent approaches.

However, a number of advantages to using participatory approaches instead of traditional methods have emerged. For instance, in Papua New Guinea, Mercer *et al*. (2008) found that participatory techniques were adaptable and flexible and allowed for a far greater understanding of the situation than standard interview or survey methods; which improved over time. This led to increased knowledge sharing and transfer, which enabled the identification of indigenous and non-indigenous risk-reduction measures.

In the Philippines, de Dios (n.d.) found that the participatory approach was strong when used to identify local perspectives on disaster experiences and responses and how communities increased or decreased vulnerabilities.

Pelling (2007) states that while extractive approaches tend to be owned by the agency, and therefore do not confront existing power inequalities, participatory techniques produce data that are owned by the people and this contributes to local empowerment. Similarly, Mercer *et al*. (2008) found that community empowerment was expressed via receiving and giving information and social support, optimism about the future, improved moods, and a belief in their ability to cope with environmental hazards.

Although there has been evidence of effective outcomes, there are also challenges and critiques of participatory approaches to risk assessment. For instance, there is a tendency to collect more data than is necessary to formulate good plans (Anderson and Woodrow 1998; Kohler *et al*., 2004; Mercer *et al*., 2008), which wastes time and effort as agencies often fail to use the information gathered (Cannon *et al*., n.d.). However, this can be addressed by clearly defining the goals of risk assessment and training facilitators to understand what data they need (*ibid*; Kohler *et al*., 2004).

Another important consideration concerns whether participatory risk assessments are geared towards protecting people or places (Pelling, 2006; Goodchild *et al*., 2000 in Kemp, 2008). Focusing on place rather than people, Pelling argues, fails to acknowledge a household's vulnerabilities and capacities.

Furthermore, the IFRC (2007b) found that problems may arise if a participatory risk assessment treats a community as a single unit, particularly if it is conducted quickly (Pelling, 2007). For example, Pelling notes that facilitators may not recognise power relations and varying vulnerabilities and capacities (*ibid*; Abarquez and Murshed, 2004). However, the IFRC discovered that these problems can be addressed by conducting risk assessments in different social groups which would reflect varying opinions.

There are further challenges around attaining full participation, especially amongst those more vulnerable to hazards. The first challenge is motivating people to attend, and the second is to ensure their participation. For example, de Dios (n.d.) found it difficult to mobilise marginalised groups, such as daily wage earners who could not afford to miss a day's work, or mothers with household chores. They also found it difficult to involve shy people in workshops, although Mercer *et al*. (2008) found that group work can encourage shy people.

Mercer *et al*. (2008) also contend that even if facilitators aim to give communities complete control over risk assessments, this is impossible when initiated externally because researchers will always have an agenda and retain some influence. Pelling (2007) takes this further, arguing that although more emancipatory approaches seek to increase peoples' self-confidence to challenge power structures, most are more exploitative than participatory. Hence he contends that a compromise may have to be made between reducing peoples' vulnerability and challenging local power structures.

2.7 Traditional Social Science Research: Its Role in Risk Assessment

While participatory approaches to risk assessment are widely used, traditional methods are also applied in at-risk areas. For example, Schütte (2004) used household questionnaires in Afghanistan to analyse livelihood strategies rather than targeting traditional socially constructed 'vulnerable groups'. Pelling (2006) comments that although they are not cost-effective, questionnaires do provide valuable insights into household profiles. Furthermore, the IFRC (2007b) found that semi-structured interviews have been effective for going into more depth, and for discussing sensitive issues.

According to Pelling (2007), the most widespread view is that PLA tools should be used to identify key themes, while traditional research methods such as structured questionnaires can produce "*more easily aggregated data*" (*ibid*: 382). For example, van Riet (2009) describes a risk assessment conducted in the Free State, South Africa, that used participatory techniques and also traditional quantitive methods in the form of 3,647 questionnaires. He found that these surveys were useful for producing data on 'generic vectors of vulnerability', which enabled useful comparisons between communities. However, he found that they could not explain the local risk context, which was achieved by using participatory methods. He also discovered that surveys used greater financial and human resources, and concluded that while recognising the importance of high quality data to inform decision-making, surveys should be used to supplement qualitative approaches.

Geographical Information Systems (GIS) have also been shown to be effective in risk assessments. GIS, which comprises software, hardware and data inputs, produces maps and complicated analysis based on several data sources (or layers) (Weiner *et al*., n.d.). It can be use to plot areas of hazards, vulnerability and risk. However, this method tends to put the focus on the 'place' rather than the 'people' at risk. To counteract this, public participatory geographical information systems (PPGIS) can be used at local level to validate data from hazard or risk maps drawn by community members and these can also help with providing quantitative data for up-scaling of plans (Kemp, 2008).

Despite the challenges of conducting participatory risk assessments, the consensus is that participatory techniques should be an essential aspect of risk assessment due to their potential to reduce disaster risk by engaging researchers with local people in order to identify and analyse vulnerabilities and capacities and identify strategies (Venton and Hansford, 2006; Pelling, 2006; Mercer *et al*., 2008).

2.8 Summary

This chapter has explored the progression of thinking around key concepts and frameworks around disaster risk, from a hazard-centric view to a more holistic understanding. Literature on the evolution of thinking around development has shown a movement from a positivistic perspective to people-centred participatory approach, followed by a similar progression in the field of social science research. The chapter concluded by introducing risk assessment, with a focus on the strengths, challenges and critiques of participatory risk assessment, as well as a discussion around the role of traditional research methods in risk assessment.

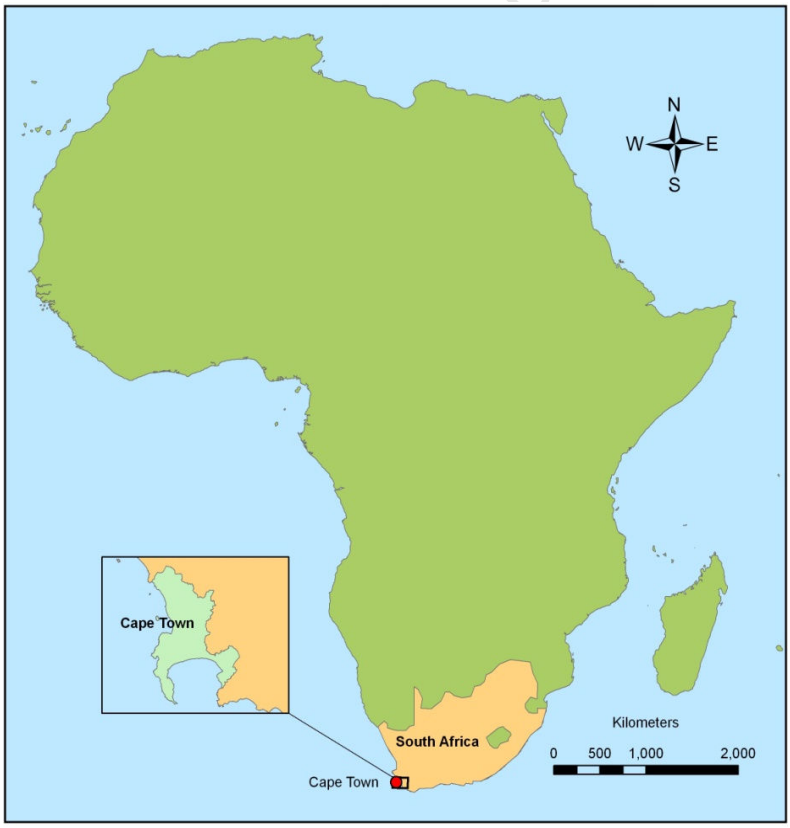
CHAPTER 3
RESEARCH CONTEXT

3.1 Introduction

The context for this study is informed by concerns about rising urban risk patterns within Africa (Pelling and Wisner, 2009a). It is also shaped by the characteristics and features of the City of Cape Town's numerous and diverse informal settlements. The research specifically took place in Section D of Sweet Home Farm (often referred to as "Sweet Home"), an informal settlement located within Philippi, a suburb of the City of Cape Town's Eastern Metropol (Figures 3.1 to 3.3).

Sweet Home is characterised by high levels of unemployment, poverty, HIV and TB. It also experiences high levels of fires, floods and crime, as well as problems relating to solid waste and poor environmental health. Some of these risks unfold into discrete events, while others are chronic everyday risks. This chapter describes the specific research context for Sweet Home.

Figure 3.1 Location of Cape Town, South Africa



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3.2 Urban Risk in Africa: Focus on the City of Cape Town

Many challenges faced in Cape Town's informal settlements mirror global and continental urban risk trends. Urban risk is of particular concern within Africa due to the rapid growth of its medium-to-large cities, which are largely unplanned (McGranahan *et al*., 2007; Pelling and Wisner, 2009a). A significant number of these towns and cities are situated along the coast and are exposed to storms and sea-level rise (Satterthwaite, 2007). Furthermore, Africa has the world's highest percentage (12%) of its urban population living in the low elevation coastal zone (LECZ) (McGranahan *et al*., 2007).

In this context, the Cape Peninsula has long been known as the 'Cape of Storms' (Holloway and Roomaney, 2008), and every year experiences storms that result in heavy rainfall, which trigger flooding. The Western Cape is projected to have weakening winter rainfall and a shift to more irregular rainfall of possibly greater intensity, which could increase the frequency and severity of flooding (Midgley *et al*., 2005; Mukheibir and Ziervogel, 2006).

Within South Africa, urban migration has been shaped by policies implemented under colonial rule, which reduced livelihood options for African men, forcing them to work as cheap labour in mines and on farms. This was reinforced by the Group Areas Act of 1950 when the South African government, under the apartheid system, classified the population by race, designating land areas for each (Feinstein, 2005). Those classified as 'black' or 'coloured' were barred from living in city centres, the main sites of employment, and in the 1970s informal settlements began to appear as labourers gravitated to cities in search of work (*ibid*).

However, authors (Satterthwaite, 2007; Action Aid, 2006) contest that the key problem underlying urban risk is not population growth alone. They argue that when urbanisation happens too rapidly, cities often fail to adapt at the same pace. This results in the rapid expansion of already-overcrowded informal settlements, which have poorly built housing, lack basic infrastructure and are often located in hazard prone areas.

The City of Cape Town has many of these characteristics. With a population of 3.4 million in 2007 (CoCT, n.d. b), it had 311 informal settlements in 2005 (CoCT, n.d. a), many of which are prone to fire and flooding. However, residents face greater stresses associated with everyday chronic risks, such as unclean water, sanitation, access to food and housing, solid waste, crime, and road traffic accidents (Pelling, 2003; Pelling and Wisner, 2009a).

These everyday hazards that underlie chronic disaster risk increase people's vulnerability or lower their resilience to ccatastrophic disaster (Kasperson *et al*., 1999 in Pelling, 2003). Moreover, when catastrophic events occur, the greatest loss of life comes not from the direct impact but from these same 'everyday' stresses and chronic risks (Pelling, 2003).

3.3 Overview of Philippi, Location of Sweet Home Farm

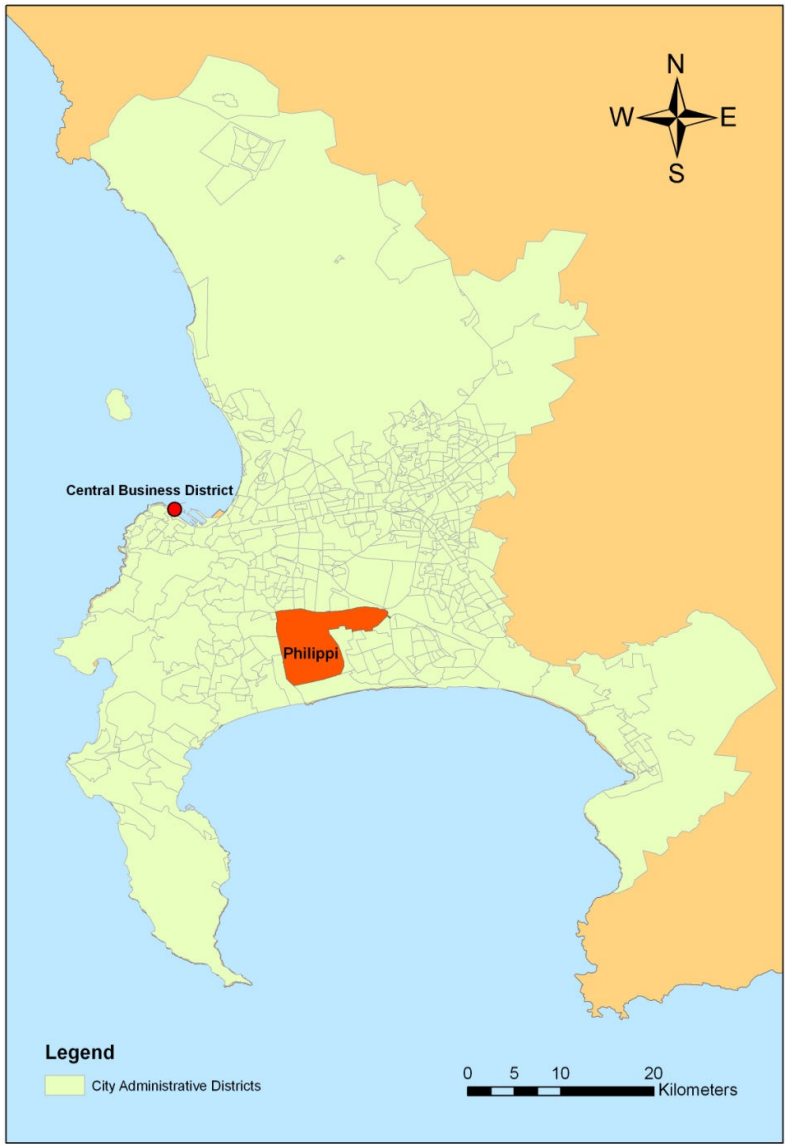
3.3.1 Historical Context for Philippi

Sweet Home is located in Philippi East on the Cape Flats (Figure 3.2), situated between the Hottentots-Holland Mountains and the Cape Peninsula (Adlard, 2008). Before it was

settled, it was a sandy, windblown wilderness, poorly drained, with little vegetation, and virtually uninhabitable, impassable and uncultivable (*ibid*).

The area known today as Philippi was originally inhabited by Dutch and German settlers, the first recorded settlement being noted in 1833, when local residents built a chapel among the sand dunes. In the ensuing years, up to the 1970s, the land was used for grazing (Adlard, 2008).

Figure 3.2 Location of Philippi District, Cape Town



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In 1974, the first informal dwellings were erected in Philippi after the occupants of Brown's Farm were reportedly informed they could not live there so they relocated to Philippi (Adlard, 2008). The area also became a place of political refuge from conflict and violence in the former Ciskei and Transkei homelands (CoCT, 2007 in Anderson *et al*., 2009). In the late 1970s, Philippi became established as an industrial township (DiMP, 2009).

Philippi was initially divided into two areas: Philippi West, known as Brown's Farm, an agricultural area, and Philippi East, created due to the demand for cheap land and also because of its close proximity to the airport and N2 Highway (iSLP in ARG, 2006; Adlard, 2008). However, political faction fighting disrupted future site development (Adlard, 2008).

There was substantial growth during the early 1980s when the first informal settlement appeared (Adlard, 2008). However, it also became known as an "apartheid battleground", characterised by the absence of an effective local authority and constant conflict between local leaders (*ibid*).

In recent times, Philippi's population has increased substantially, from 56,659 in 1996 to 110,316 in 2001 (University of Stellenbosch, 2005), the current population estimated as being around 150,000 (Cordaid, n.d.).

During the early 1990s there were plans for a 'Wetton-Landsdowne-Philippi Corridor', extending one kilometre either side of Landsdowne Road with Philippi as its centre (ARG, 2006). Philippi East was also identified as a potential central business district (CBD) for southeast Cape Town in 1996 (Adlard, 2008). However, its proximity to Crossroads settlement, known for "warlord" violence, deterred potential investors (iSLP in ARG, 2006; Adlard, 2008). Therefore, it was decided to establish a CBD in Khayelitsha instead. As a result, Philippi East remains underdeveloped (ARG, 2006).

3.3.2 Socio-demographic Changes and Challenges

Philippi has gone through several periods of rapid expansion (CoCT, 1998 in Anderson *et al*., 2009). Between 1996 and 2001, the population grew by 48.6% (University of Stellenbosch, 2005), which placed a great strain on already stretched public resources (*ibid*). Because of this rapid expansion, the size and parameters of Philippi are unknown (Anderson *et al*., 2009). However, according to the City of Cape Town (n.d.), in 2007, Philippi had 23 informal settlements, containing 15,418 dwellings.

A large number of Philippi residents have migrated from the Eastern Cape to Cape Town seeking work and improved access to state welfare grants and administrative services (CoCT, 2005). However, there remains a deep-rooted interdependence on the 'dual-household' structure of Eastern Cape – Cape Town residents, resulting in regular travelling back to the Eastern Cape (CoCT, 2005).

Philippi, similar to many townships in Cape Town, experiences many problems, including poor education levels, violent crime, substance abuse, environmental degradation and HIV/AIDS (SAEP, 2009 in Anderson *et al*., 2009), which are rooted in governmental structures created by the apartheid system (Anderson *et al*., 2009). For example, between 1996 and 2001, AIDS-related deaths accounted for 17.6% and 31.5% of deaths and unemployment rose from 15.1% to 43.1% (University of Stellenbosch, 2005). Of those who work, most are employed in elementary occupations, craft and trade, or the service sector (Anderson *et al*., 2009), 8.6% of adults have no schooling, 43.3% have only primary education and only 17.3% have matric (2001 Census and 2007 Population Estimation Figures in Anderson *et al*., 2009).

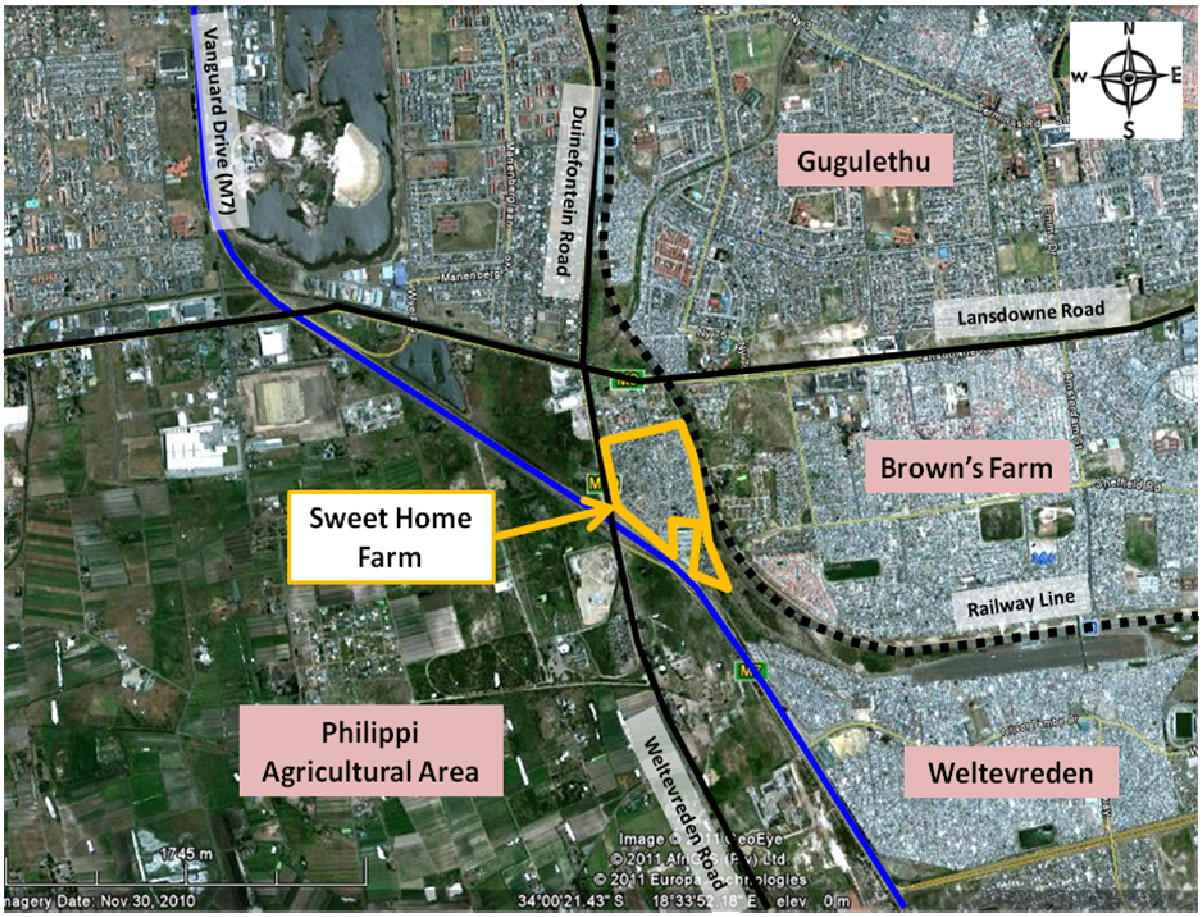
3.4 Sweet Home Farm

3.4.1 Location

Sweet Home is situated in Philippi East and is named after the farm on which it was situated (ARG, 2006). It shares boundaries with suburbs of Gugulethu to the north, Brown's Farm to the east, Weltevreden to the southeast and Philippi agricultural area to the west (ARG, 2006). It is approximately 16.5 hectares in area (Rodriques *et al*., 2006).

The settlement is also flanked by Lansdowne Road to the north, Weltevreden Road to the west, Vanguard Drive to the south and a railway line to the east (Figure 3.3), which have acted as barriers, making it unsafe to access adjacent areas. They have also increased its isolation in terms of access to clinics, schools, transport and community centres (CoCT, 2005), causing it to lag behind in terms of its development compared with other informal settlements (ARG, 2006; The Warehouse, n.d.). For example, in a survey conducted among residents in Joe Slovo, Nqnqubela K-Section and Sweet Home, Sweet Home was frequently reported as having the most unfavourable statistics (CoCT, 2005).

Figure 3.3 Sweet Home Farm in Relation to Surrounding Area and Transport Network



Google Earth

As Sweet Home grew in density, conditions worsened, especially in winter. This obliged the City of Cape Town to buy the land which enabled them to provide basic services. However, although the City was able to procure much of the land, a large section

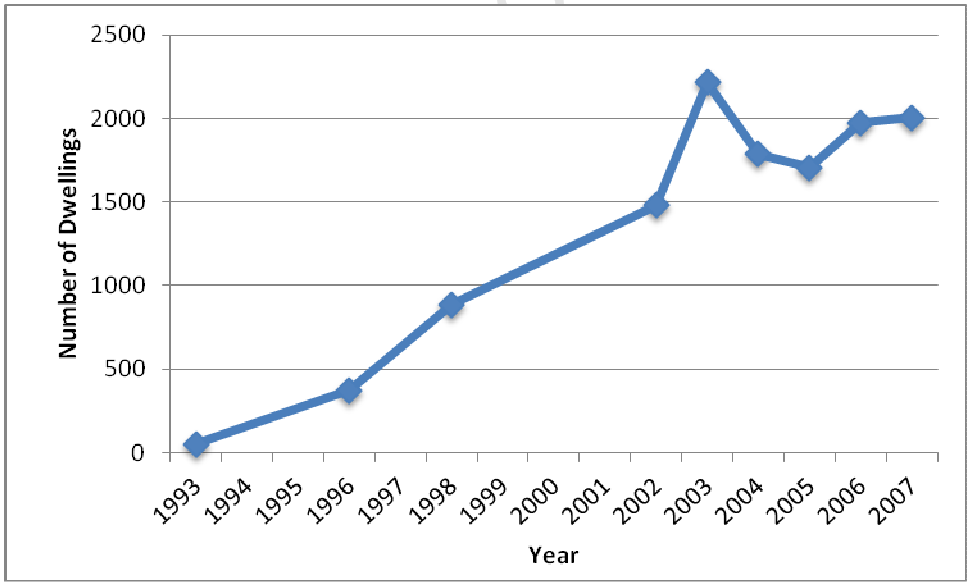
remained privately owned, some by the South African Rail Commuters Corporation (SARCC) and another section owned by a private land owner. Although the City was able to provide basic services to their newly bought land and was given permission by the SARCC to provide services on their land, they were not given permission to provide services to the land owned by the private land owner. This resulted in significant inequality in living conditions within Sweet Home. Section D is located on the land owned by the private land owner, henceforth referred to as the 'private land'.

3.4.2 History and Settlement Profile

Sweet Home Farm, as the name suggests, was originally a farm, and a large chicken farm is still located on the southeast corner. It was also used as a dumping site for builders' rubble and residents continue to make a living by cleaning bricks and selling them by the road side (Adlard, 2008; The Warehouse, n.d.).

People first started building dwellings in Sweet Home in 1992, with 52 informal homes having been erected by January 1993. By 2007, this number had increased to 2,005 dwellings (CoCT, n.d. a). Figure 3.4 (Figures in Annexure 3.1) shows the estimated rate of growth between these years, based on dwelling counts and household occupancy based on an average household size of 3.18. The reduction in dwelling numbers in 2005 and 2006 is possibly attributable to a settlement upgrade, when dwellings were removed to make space for roads. It is not clear why there was an increase in 2003.

Figure 3.4 Number of Dwellings between 1993 and 2007



(Abbott and Douglas, 1999; ARG Design, 2006; CoCT, 2005; Rodriques *et al.*, 2006; Adlard, 2008; CoCT, n.d.).

3.4.3 Socio-demographic Profile

The majority of residents (90.5%) are isiXhosa speakers from the Eastern Cape (CoCT, 2005). There is also a small coloured community, descendents of the original farm labourers, who are well integrated into the community (DiMP, 2009). The average household size is reportedly 3.2 members per household, with 10% one-person

households (ARG, 2006). However, household sizes fluctuate due to work availability and regular travel between Cape Town and the Eastern Cape (CoCT, 2005).

Formal education is low, with 25.6% and 8% of adults completing primary education and matric respectively (CoCT, 2005).

Unsurprisingly, unemployment is very high, between 53% and 70% (ARG, 2006; The Warehouse, n.d.). Of those who work, most are employed in the construction industry, manual labour, street trading and farm work (CoCT, 2005). The average household income is also low, reportedly R 1,271.90 per month (*ibid*), with at least 40% of households receiving state grants in one form or another (ARG, 2006).

Hunger[2] is a widely used indicator of the degree of poverty (CoCT, 2005), with high rates of hunger and malnutrition being reported in Sweet Home (The Warehouse, n.d.). In 2004, 18.4% were hungry 'often', 45.4% were hungry 'sometimes', with only 31.6% stating they were 'never' hungry (CoCT, 2005).

Twenty two percent of the population suffer from chronic illnesses (ARG, 2006), the most prevalent being tuberculosis (23.8%), asthma (9.5%), hypertension (8.6%), stomach ailments (8.6%), and HIV/AIDS (3.8%), although the latter is likely to be under-reported due to social stigma, and also because it is often masked by TB symptoms (*ibid*).

3.4.4 Basic Service Provision

Prior to 2003, Sweet Home had no electricity (formal or informal) and the majority (73%) of residents had access to bucket toilets[3] only (CoCT, 2005) because half of the settlement was situated on private land (DiMP, 2009).

Following a survey in 2004, Sweet Home was upgraded by the City in 2005, resulting in the construction of flush toilets, roads, stormwater drainage, a detention pond, electricity and water standpipes (CoCT, 2005). Unfortunately, the upgrade was only provided on SARCC property and land purchased by the City because the private landowner refused permission for the City to provide basic services (DiMP, 2009). This has resulted in a notable disparity between the living conditions of residents on municipal land and those on the privately owned property.

Sweet Home is served by five primary schools and two secondary schools (which are very overcrowded) within two kilometres of the settlement. However, unemployed parents struggle to afford transport costs (DiMP, 2009). There is also a high level of absenteeism amongst school children (ARG, 2006). Moreover, some children born in the Eastern Cape have difficulty being accepted into local schools due to marginalising factors such as an absence of birth certificates (CoCT, 2004).

Similarly, access to clinics constitutes a significant problem for residents. Although there are two clinics within two kilometres (CoCT, 2005), there is a dire need for a clinic at

[2] Hunger defined as, "no food eaten at all, for the day" (CoCT, 2005: 49). NB. The report does not define 'often' or 'sometimes'.

[3] 73% of residents used bucket toilets, 14% had access to flush toilets, 8% had home-made pit latrines and 5% used no latrine, using open areas instead (CoCT, 2005).

Sweet Home (ARG, 2006). Moreover, despite a very high rate of HIV/AIDS, the nearest clinic only treats TB patients (The Warehouse, n.d.).

Even though there is constrained access to public services, modest support is provided by The Warehouse, a faith-based NGO that has worked in Sweet Home for many years. They have been instrumental in establishing a church, crèche, and support groups for senior citizens, people with HIV/AIDS and teenagers (The Warehouse, n.d.). There is also an informal mosque situated on Duinefontein Road.

3.4.5 Risk Profile

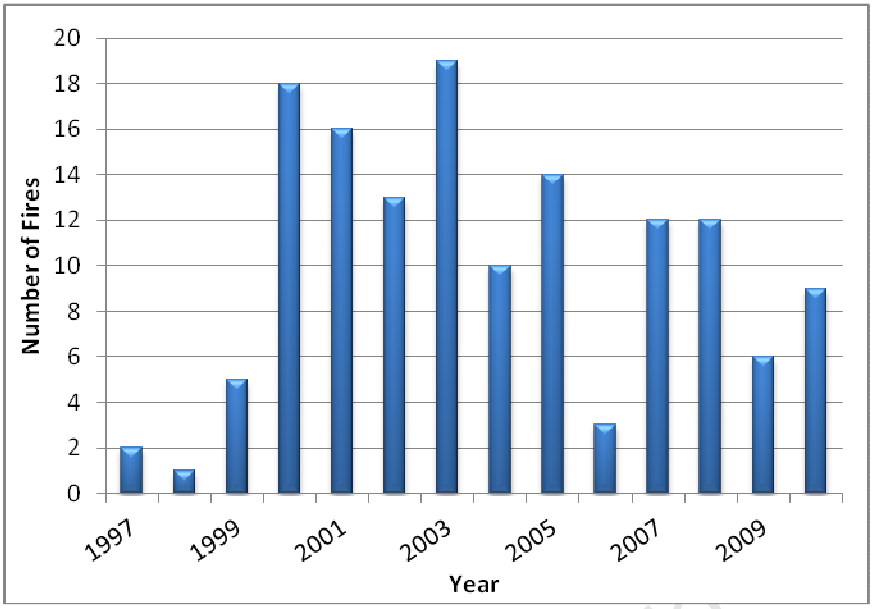
As the settlement has grown, conditions have worsened, especially in winter, with a well-documented hazard history of flooding, fire, environmental health-related problems and crime (ARG, 2006). The settlement also faces environmental health risks due to its proximity to the chicken farm and also to its poor levels of basic service provision related to water and sanitation.

In addition, Sweet Home is particularly prone to heavy rainfall as it is located on wetlands with a high water table (Cape Town, IDP Review 06/07 in South African Cities Network, 2006; The Warehouse, n.d.). Furthermore, there is a substantial depression in the centre of the informal settlement, most of which is located on the private land, which becomes a pond in winter (DiMP, 2009). During a survey in 2004 (CoCT, 2005), 74% of residents reported that they always had problems with flooding, with a further 11.2% reporting occasional flooding problems. Additionally, the CoCT Disaster Risk Management stated in 2007 that there was a 50% annual probability of flooding (DiMP, 2009). Sweet Home experienced flood related realised risks in August 2001 (DiMP, 2009), August 2004 (CoCT, 2004; CoCT, 2005), May 2007 (CoCT, 2007b) and July 2007 (du Plessis *et al*., 2007).

Informal settlement fires are also reported to occur regularly (DiMP, 2009). Homes are typically constructed from flammable materials, such as wood, cardboard and plastic, and are more susceptible to fire due to housing density (The Warehouse, n.d.). Additionally, a survey by the City of Cape Town (2005) indicated that Sweet Home residents had little understanding of fire risk factors or measures to take in the event of fire.

Sweet Home experienced nine significant fire incidents between 1999 and 2010, each event affected 10 to 35 dwellings (MANDISA, n.d.; CoCT Fire and Rescue Service, n.d.). Although accurate data on the number of dwellings destroyed is unavailable, Figure 3.5 shows the number of recorded fire events between August 1997 and July 2010.

Figure 3.5 Fires Events: Sweet Home Farm, August 1997 to July 2010



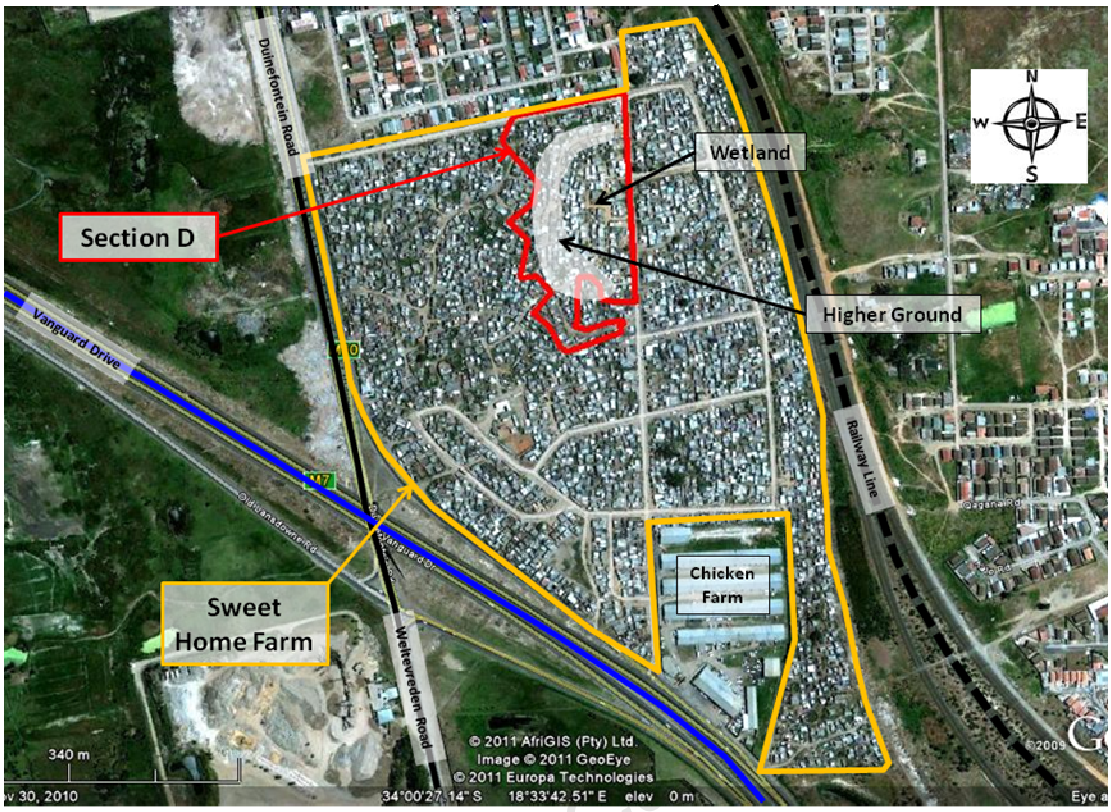
(MANDISA, n.d.; CoCT Fire and Rescue Service, n.d.)

Crime also poses a serious threat to residents. According to a report by the City of Cape Town (2005), the most commonly reported crimes in Sweet Home in 2004 were 511 robberies (76.1%), 36 reports of property damage (5.4%) and 29 housebreakings (4.3%). Furthermore, the report states that rape is vastly underreported, sexual abuse of women and children occurs, and prostitution is a common source of income, particularly for poverty-stricken women, leading to high rates of HIV/AIDS infection. The report maintains that crime is mainly attributable to alcohol and substance abuse, with high levels of drunkenness at any time of day, plus weekend binge-drinking (CoCT, 2005). Sweet Home has a Community Police Forum (CPF), one of six, part of a larger Philippi CPF (*ibid*). According to the Department of Community Safety (DiMP, 2009), Sweet Home has the lowest crime rate among the six CPFs.

3.5 Study Site: Section D, Sweet Home Farm, Philippi

Section D, the study site for this research, is shown in Figure 3.6 below. The shaded area identifies a bank of higher ground. The ground to the centre right was a vlei (wetland) and is prone to flooding. As approximately 320 dwellings are located in this section, it is estimated that about 1,018 people are resident here (based on a household rate of 3.18 occupants). Unlike other serviced areas of Sweet Home, Section D is located on private land. At the time when the field research was done, this area contained minimal essential services as the landowner refused to allow them to be established. Rudimentary services provided include bucket toilets and some standpipe taps along the north and east boundaries. Fortunately, it was announced in December 2010 that legal measures taken by the City had resulted in the landowner being forced to sell this land parcel (News24.com), which is expected to enable the provision of basic services and development of the land.

Figure 3.6 Section D, Sweet Home Farm



Google Earth

3.5.1 Selection of Study Site

Section D was selected as the study site for this research because the researcher participated in a course-based community risk assessment (CRA) in Section D in 2009 and was familiar with the settlement. Sweet Home presents the wide range of risks experienced by many of Cape Town's informal settlements, described in 'Weathering the Storm' (Holloway and Roomaney, 2008). However, it provides an interesting case study, looking at the impact that being located on private land and very limited service delivery has on urban risk. A further consideration in choosing Sweet Home was its relative safety for conducting fieldwork.

3.6 Summary

Urban risk experienced in Cape Town's informal settlement mirrors trends throughout Africa and globally, where development has been unable to keep pace with the rate of urban migration. This chapter described how apartheid and other socio-economic factors have affected the development of Cape Town's informal settlements, specifically Philippi, and, in combination with geographic and meteorological features, have created an urban risk profile for Sweet Home Farm similar to that experienced by many of the city's informal settlements situated on the Cape Flats. The study site, however, provided an additional contextual feature, due to its location on private land.

CHAPTER 4
METHODOLOGY

4.1 Introduction

This study sought to investigate the risk profile of one informal settlement in the City of Cape Town, through the application of a household survey methodology. In this context, it represents a case-study comparing informal settlement risk which is examined through the respective lenses of community risk-assessment (CRA) and household survey research methodologies.

This chapter describes the process of data collection, including the use of retrospective findings derived from a course-based community risk assessment conducted in 2009. This is followed by a description of the methods used to consolidate, compile and analyse the information gathered. The chapter concludes with an overview of important constraints that may have affected the robustness of the research.

4.2 Data Collection

4.2.1 Overview of Data Sources

Numerous quantitative and qualitative data sources were used in the course of this research. These included secondary data sources and information gathered through a course-based community risk assessment in 2009. They also included primary data collection through field research in 2010. Annexure 4.1 summarises stages in the primary research process.

4.2.2 Secondary Data Sources

A wide range of secondary data sources were consulted. These included UCT resources, particularly DiMP, who hold the MANDISA Fire Database, which contains fire data for Cape Town's informal settlements for the period from 1995 to 2005. Fire data was also sourced from the City of Cape Town's Fire and Rescue Service. Various reports, policy documents and statistics were obtained from other City of Cape Town governmental departments. Spatial information comprised satellite imagery available on Google Earth and aerial photography from UCT's Geographical Information Systems (GIS).

4.2.3 Community-Based Risk Assessment in 2009

The research was informed by a community risk assessment conducted in March 2009 as part of the Disaster Risk Science post-graduate course, supervised by an experienced facilitator from DiMP. It applied participatory assessment activities described in 'Weathering the Storm: Participatory Risk Assessment for Informal Settlements' (Holloway and Roomaney, 2008), which was written for the context of informal settlements in South Africa's Western Cape. The CRA activities conducted are described in Annexure 2.1 and the process in Annexure 4.2. In addition to the CRA conducted in Section D in 2009, four additional CRAs were also conducted in other sections of Sweet Home by other student groups as part of the same exercise. Primary data collected by these CRAs generated reports that provided further secondary data sources for this study.

4.2.4 Primary Data Sources Through Field Research

Primary data for this study was collected via field research in Sweet Home in 2010. This process commenced on 29th June and concluded on the 23rd July 2010. It involved a survey of 50 households, using a questionnaire comprising open-ended and closed questions. Field research also employed observation, photographs, Global Positioning System (GPS) and GIS. The field research took place during Cape Town's winter season, which is characterised by reduced hours of daylight, colder temperatures and higher rainfall. To ensure the personal safety of the researcher, interviews were conducted between Monday and Friday and between 10 am and 4pm. The research was also conducted during the FIFA Football World Cup.

4.2.5 Development of Data-Gathering Methods

Several data-gathering tools were developed and applied during the course of this study. These included a household questionnaire, a structured interview guide for key informant interviews, and an observation checklist.

Household Questionnaire

The questionnaire (Annexure 4.4) focused on important risk themes such as fire, flood, crime and solid waste. It was aligned as closely as possible to the previously applied CRA methods to ensure comparability between the two approaches (Annexure 4.3). In addition, it had both closed questions to elicit answers that could be measured and analysed and open-ended questions to allow for descriptive answers.

Respondents' opinions were also sought on the respective value of the CRA and household survey methods. Interviewees who participated in both were asked which approach they preferred and why.

Guide for Key Informant Interview

Key informant interviews were conducted with government officials and the community leader in order to enable comparison with the household questionnaire findings. Interviews used a structured format provided in Annexure 4.5.

Field Observation Guide

Field observation was used as part of the household survey to investigate changes in solid waste risk between 2009 and 2010. Observations recorded hazards, resources and risks and factors that increased and/or decreased risk. With regard to hazard-specific risk, field observations were made in accordance with an observation checklist (Annexure 4.6). Additionally, locations that had a serious solid waste problem in 2009 were revisited in 2010 and photographs taken for comparison.

Spatial distribution of risks was achieved by taking GPS readings of resources (standpipe taps, toilets, solid waste containers) and hazards of households which participated in the household survey and gave permission to do so. 50 residents participated and one resident refused to give permission.

4.2.6 Community Access and Selection of Research Assistant

To gain access to, and acceptance by, residents in Section D, a primarily isiXhosa-speaking area, The Warehouse NGO programme co-ordinator for Sweet Home facilitated entry by obtaining permission from the community leader. He was also instrumental in introducing the researcher to the research assistant. Although the research assistant did not live in Section D, she had lived with her family in Sweet Home for a number of years and was well known in the community.

Prior to the field research commencing, at least three preparatory days were spent with the research assistant, clarifying disaster risk concepts (Annexure 4.7) and the questionnaire. The field assistant acted as gatekeeper, guide and interpreter within Section D throughout the four weeks of field research.

4.2.7 Selection of Household Study Sample

It was not possible to select a systematic sample for Section D because many dwellings were unoccupied during the day. However, households were spontaneously identified to ensure geographic coverage of the whole area. As noted in Chapter 3, it was estimated that 320 dwellings were located in Section D at the time of research. This equates to approximately 15.6% of households which participated in the survey.

To complete the investigation into solid waste risk, all interviewees were required to have lived in Section D since at least March 2009, i.e. the time of the CRA. However, they were not required to have participated in the CRA.

The survey was pilot-tested with the research assistant and two other households to test completion time, relevance and clarity of questions and cultural appropriateness of the instructions. The questionnaires were answered by the household head or another resident adult.

4.2.8 Identification of, and Interviews with, Key Informants

Key informant interviews, a phone conversation, and one focus group discussion were conducted with nine government officials and representatives during the course of this study. These included the Sweet Home community leader, two field officers from Disaster Risk Management, the Guguletu Fire Station platoon commander, three senior foremen from the Solid Waste Department, the head of contract management for Solid Waste Management and the Station Commander of Samora Machel Police Station. These key informants were chosen because they had either participated in the post-CRA meeting or were directly involved with the community.

4.2.9 Ethical Consideration in Data Collection

Recognising the sensitive nature of this research, measures were taken to ensure that participation in the survey was voluntary, information gathered would be treated as confidential and the identities of survey respondents would remain anonymous. Therefore, before each interview the researcher introduced himself, explaining that he had been part of a group from UCT that had conducted a CRA in 2009. He further explained that as part of his studies, he was required to conduct a research project on locally experienced risk. He explained that, unlike the CRA, this research would involve interviews with residents in their homes. The student clarified that the research results

would not automatically inform local project planning. He also explained that, because the 2009 CRA prioritised solid waste risk, any changes in this risk would also be investigated.

Furthermore, it was made clear to each participant that the survey would take 30 to 45 minutes, they would not be required to answer any questions they did not wish to, and they were given an assurance of confidentiality and anonymity. Moreover, GPS readings of their dwellings and photographs of residents, their children or their homes would be taken only with prior consent.

4.3 Data Consolidation and Analysis

4.3.1 Compilation and Consolidation of Data

Quantitative and qualitative data from the CRA and household survey was consolidated into Excel spreadsheets. These were organised according to each section of the household survey, i.e. risk assessment according to interviewees' priority hazards, perceptions of each approach, and changes in solid waste risk. Each questionnaire was assigned a number from 1 to 50.

The focus group and four key informant interviews were recorded, after which they were transcribed verbatim. This information was later related to data from the household survey.

Spatial data from the GPS readings was compiled into Excel spreadsheets. GPS readings for resources, hazards and households that participated in the household survey were then plotted onto GIS. Each household was also colour identified according to the priority hazard for each household, which allowed for spatial analysis of priority hazards.

4.3.2 Data Analysis

The consolidation of quantitative and qualitative, and spatial data allowed analysis of the risks reported in Section D. Comparisons were made between the findings of the household survey and the data from the CRA undertaken a year earlier. Some of this analysis was more descriptive in nature while other data was compared using tables and percentages.

4.4 Limitations and Constraints

In retrospect, several problems in the research design made it difficult to compare the findings from the CRA with the primary field research because the CRA was not designed or conducted with the purpose of being analysed at a later date. This resulted in missing data that would have been useful for a comparative study.

In addition, there were other factors that limited the robustness of the CRA process. For instance, it was confined to two days, making it difficult to cover the whole area in depth. Apart from the transect walk, all the exercises were conducted in the centre of Section D, which may have excluded residents living on the periphery. Additionally, because it was held on weekdays during working hours, it excluded day workers, which could explain why more participants were women (Arthern *et al*., 2009). Moreover, the CRA was undertaken by postgraduate students, as a component of a post-graduate

module. However, this field exercise was part of a carefully planned process, facilitated by DiMP, that conformed with recognised development practices (*ibid*).

There were a number of other factors that could have impacted on the reliability of the primary research. For example, the household survey was conducted 16 months after the CRA, and at a different time of year (i.e. the CRA was conducted during summer and the household survey was carried out during winter). While these factors constrained comparison of priority hazards using different risk assessment methodologies, it allowed for comparison of priority hazards according to seasonality. Additionally, it provided an opportunity to conduct the investigation into the change in solid waste risk.

There were additional factors that may have inhibited residents' participation. The researcher was a white, non-South African, non-isiXhosa speaking male which may have reduced people's willingness to talk more openly, particularly because the majority of interviewees were non-English speaking women, who may have felt intimidated by the research process. The researcher sought to close this social space by regularly eating meals within the community and spending time talking to curious bystanders. It is also possible that language difficulties between researcher and research assistant could have resulted in interpretation inconsistencies.

Another factor that appeared to inhibit people's participation was "boredom" during the interview. Although, the duration of the questionnaire was explained to each interviewee before starting, it was evident from interviewees' body language and short answers that a number of respondents became bored quite quickly. This resulted in answers that were short and less descriptive.

Further constraints relate to the use of GPS. When using GPS to plot locations, there is room for human and technological error. Human error could involve misusing equipment and technological error can result from changing satellite locations, as well as interference due to the close proximity of many metal-roofed dwellings. This resulted in readings with a margin of error of up to 5 metres.

4.5 Summary

This chapter described the process of data collection from primary and secondary sources to conduct both risk assessments using participatory and household survey methodologies. This was followed by a description of the qualitative and quantitive methods used to collect data, and the process of conducting field research in Section D. The chapter then explained the compilation, consolidation and analysis of data collected, concluding with factors that may have constrained field research. This process enabled an investigation of the risk profile of Section D and a comparison of results generated by both methodologies. It also allowed the opportunity to examine the potential of participatory approaches to effect change, through the examination of solid waste management. The findings related to the aims are presented in the following chapter.

CHAPTER 5
FINDINGS

5.1 Introduction

This chapter presents the study's results. It begins by describing the profile of household respondents and then presents descriptive results from the household survey risk assessment, which is followed by an analysis of outcomes. The chapter continues by comparing the household survey risk assessment results with those generated by the community risk assessment. It concludes by examining the development potential of community risk assessment as an action research methodology through observed and reported changes in solid waste management.

5.2 Socio-demographic Profile of Survey Respondents

Table 5.1a below summarises socio-demographic characteristics of the 50 survey respondents. It reflects a respondent profile biased towards women (64%). However, it also shows a bias towards male-headed households (76%). The table also profiles a young study population, with only 28% aged 31 or over. The majority were aged 0 to 15 (32%) or 21 to 30 (29%). Household size varied between one and seven people, while the average household size was 2.98, comparable to the average household size in Sweet Home.

Table 5.1a Socio-Demographic Characteristics of Survey Respondents: Gender, Age and Household Size

Socio-demographic	Gender-Respondent		Gender-Head of Household		Age Profile						Household Size (No. of members)				
Category	M	F	M	F	0-15	16-20	21-30	31-45	45-60	60 +	1	2	3	4	5,6,7
No.	18	32	38	12	48	15	43	26	14	3	5	15	10	13	7
%	36	64	76	24	32	10	29	17	9	2	10	30	20	26	14

Table 5.1b profiles low levels of education, with only 14% completing Matric or higher. There were also low levels of employment security, with 66% of adults either unemployed or engaged in casual/temporary work.

The survey identified a high degree of homogeneity. Most households (49) originated from the Eastern Cape, apart from one family from another Southern African country. Annexure 5.1 compares key indicators for Section D in 2010 with those of Sweet Home in 2003.

Table 5.1b Socio-Demographic Characteristics of Survey Respondents: Education and Employment Status

Socio-demographic	Education Status of Household Adults				Employment Status of Household Adults				
Category	No Education	Primary (grade 7)	Secondary	Matric +	Permanent	Temporary/ Casual	Self-employed	Retired	Un employed
No.	3	33	50	14	13	21	6	4	24
%	3	33	50	14	19	31	9	6	35

5.3 Household Survey Risk Assessment: Descriptive Results

5.3.1 Overview

The following sections focus on the four prioritised risks of crime, flood, fire and solid waste. This section begins by presenting the perceived hazards identified by respondents and how they were ranked. Each risk is then described in turn according to perceived causal factors, realised consequences and temporal characteristics (seasonality and cyclicity). Capacities identified by respondents to reduce these risks are then described at three levels: governmental, community and household.

5.3.2 Hazard Identification and Prioritisation

Survey respondents identified eight hazards for Section D (Table 5.2). Cumulative totals reflect the respondents' perceived priority hazards, which are ranked first, second and third[4]. However, when these were differentiated by the respondents' perceived priority hazard, crime was ranked first by 22 (44%) of interviewees. Flooding, fire and solid waste were prioritised by 18%, 16% and 12% respectively.

Table 5.2 Hazard Ranking

Hazards	Hazard Ranking			
	Cumulative		Most Important	
	No.	**%[5]**	**No.**	**%**
Crime	81	27.0	22	44
Flood	39	13.0	9	18
Fire	54	18.0	8	16
Solid Waste	33	11.0	6	12
Toilets	23	7.7	3	6
Poor Housing	8	2.7	1	2
Electricity	8	2.7	0	0
Environmental Health	7	2.3	1	2
Unsure/No Other Hazards[6]	47	15.7	0	0
Totals	**300**	**100.0**	**50**	**100**

[4] Priority hazard = 3; hazard of secondary concern = 2; hazard of least concern = 1
[5] Rounded to one decimal place
[6] Only 26 interviewees could name three hazards they were concerned about

5.3.3 Focus on Crime

Causal Factors

Eighteen respondents identified unemployment as the main underlying cause of crime in Section D, while the lack of street lighting and the impact of alcohol and drugs were also mentioned (Annexure 5.2).

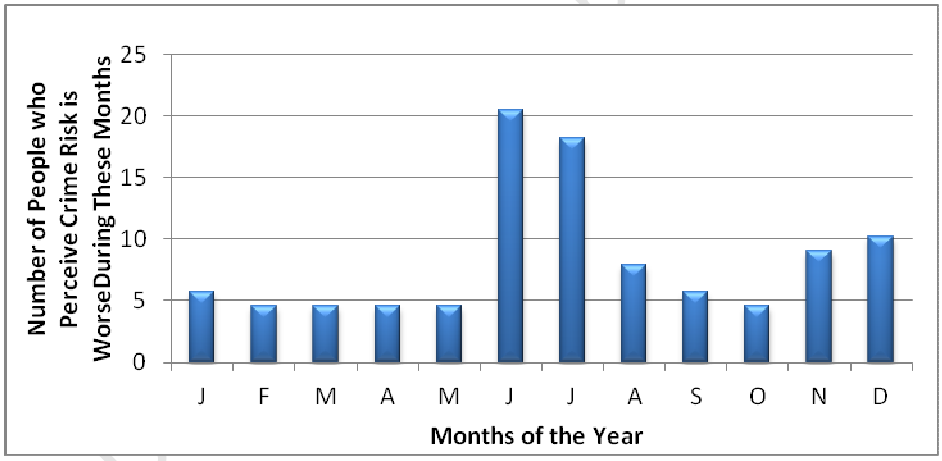
Consequences

Similarly, 18 interviewees profiled housebreakings, 11 respondents identified robbery and 3 participants reported rape as the most prevalent types of crime. The adverse effects of these crimes included the cost of replacing stolen goods and increased stress, fear and shock, which could lead to illness (Annexure 5.3).

Temporal Characteristics

Almost all respondents noted that crime worsened during June and July, because "it is darker" due to the shorter days, adding that this was compounded by a lack of street lighting. Nine and ten participants respectively also reported increased crime in November and December when residents collected end-of-year bonuses (Figure 5.1).

Figure 5.1 Seasonality of Crime Risk



Capacities

Thirteen respondents reported that nothing was being done by government to reduce crime. However, five residents noted that police patrolling had helped. Sixteen interviewees gave examples of community action, for example, 'calling the police' or 'arresting criminals', and two respondents mentioned that 'killing criminals' helped to reduce crime. At household level, three respondents reported using a burglar gate, while twelve felt they could 'do nothing' to reduce crime risk (Annexure 5.4).

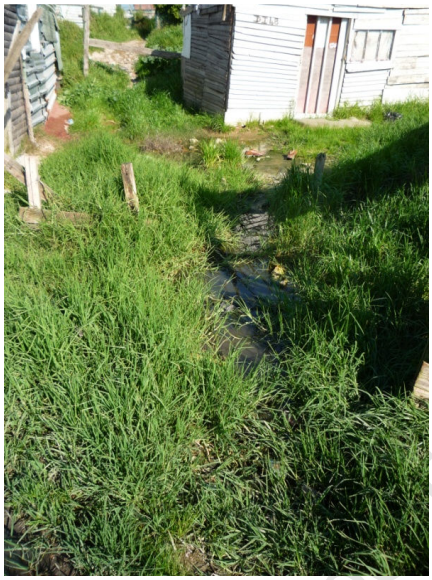
5.3.4 Focus on Flood

Causal Factors

Residents noted four factors that increased flood risk. Two mentioned excessive rainfall, two stated it was due to water rising from the floor, two believed it was because their homes were located on wetlands (Figure 5.2), and one person said it was due to a lack

of drainage. They added that although new residents were aware of this before they arrived, they had no other settlement choices. The only type of flooding respondents referred to was water rising through the floor, known as "seepage" (Annexure 5.5).

Figure 5.2 Wetland in Section D



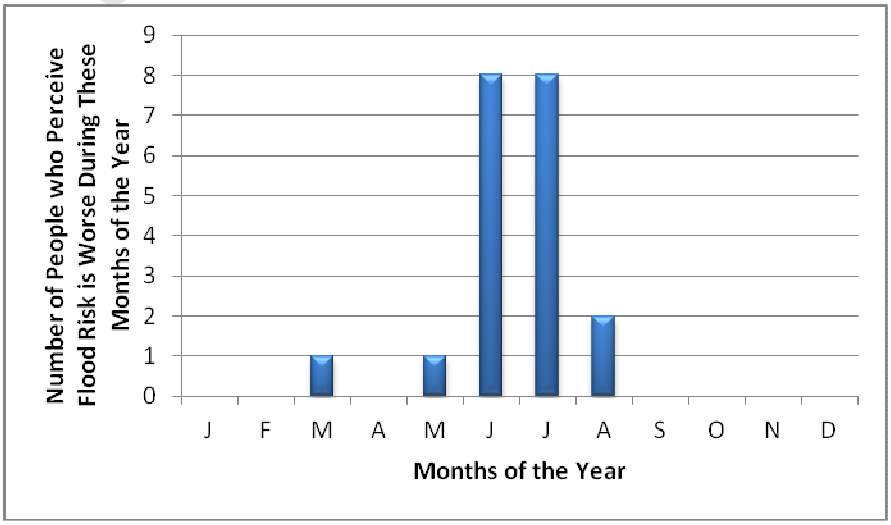
Consequences

Two consequences of flood events profiled by interviewees were health problems and water damage. Respondents reported flu, colds, headache, fever and coughing, which could result in visits to the clinic or hospital, and an inability to work. Residents also noted that water had damaged clothes, furniture and carpets (Annexure 5.6).

Temporal Characteristics

Respondents perceived that flood related events increased in June and July, because it is the rainy season (Figure 5.3).

Figure 5.3 Monthly Perception of Flood Risk



Capacities

Apart from two respondents who received plastic for their roofs, interviewees noted no other flood-related assistance from the government. Similarly, few respondents could describe community-level flood-proofing activities, apart from one resident who said that truck drivers had dumped trucks of rubble in flood-prone areas (Figure 5.4).

At household level, interviewees noted a number of purposive adjustments used before the flooding season. Four respondents stated that they laid sand or cement on the floor and/or around the edge of their dwellings (Figure 5.5) and one interviewee reported patching the roof. In the event of realised risk, one respondent reported the use of buckets to catch water, one noted that they move furniture to a dry area, and two respondents stated that they temporarily stay with relatives. During one such move, one interviewee reported that her household contents were stolen (Annexure 5.7), indicating vulnerability of household assets to both damage and theft.

Figure 5.4 Rubble in Wetland

Figure 5.5 Cement Edging

5.3.5 Focus on Fire

Causal Factors

As Section D is situated on private land, it is not provided with formal electricity and four interviewees stated this increased fire risk. Although 36 respondents reported that they access electricity via informal connections, 42 interviewees stated that they use paraffin or wood for cooking and/or heating, and 4 participants noted that this also increased fire risk. Four respondents believed fire risk was related to alcohol, explaining that when people returned from drinking at the shebeen and attempted to cooked food, this could lead to fire if they fell asleep (Annexure 5.8). They are also more likely to knock over candles. Interestingly, only one person thought fire risk increased because of the flammable nature of dwelling construction materials.

Consequences

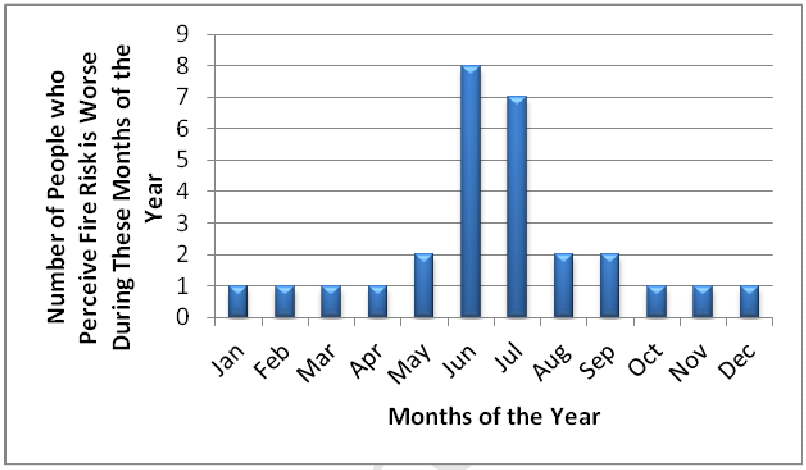
Three respondents identified death and injury as major consequences of fire along with loss of house (7), contents (4) and identity documents (ID) (5). Knock-on effects reported by interviewees are that it is very time-consuming to replace IDs, making it

harder to find work, which, on top of replacing other losses, increases poverty (Annexure 5.9).

Temporal Characteristics

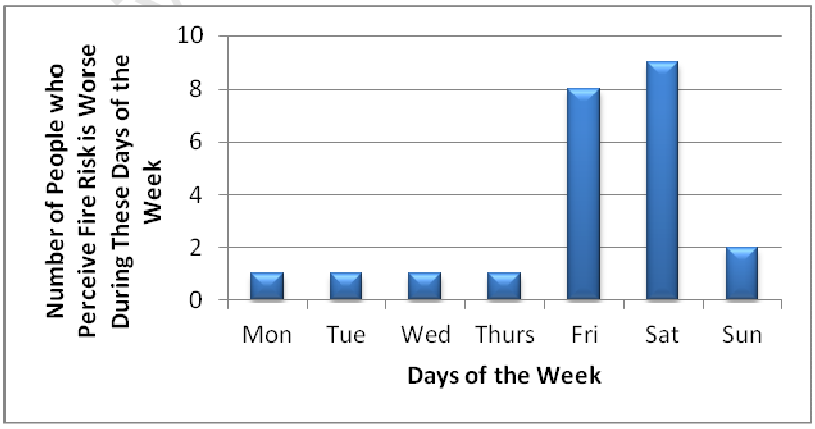
Fire risk has complex temporal and cyclical characteristics that can be interrogated by month, day of week and time of day. For instance, 15 interviewees perceived that fire events increase in June and July (Figure 5.6). Four respondents attributed this increase to winter, when people use their stoves more frequently for warmth, while 4 participants stated it was because it is more windy, enabling fire to spread more easily.

Figure 5.6 Monthly Perception of Fire Risk



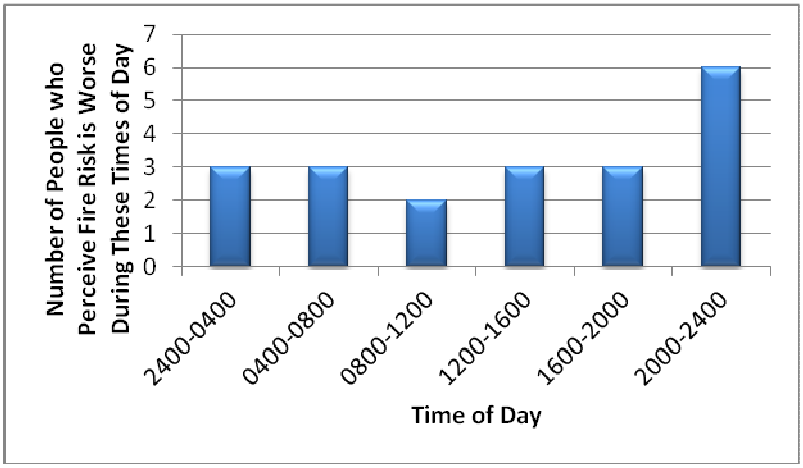
All respondents stated that fire risk increased on Fridays and Saturdays (Figure 5.7), which is consistent with MANDISA/Fire Department statistics (Annexure 5.10). Interviewees thought this was because it is pay day, followed by drunkenness, and the increased likelihood of knocking over stoves and candles.

Figure 5.7 Daily Perception of Fire Risk



Interviewees noted that fire events occurred throughout the day, increasing in the evenings (Figure 5.8). Results are also consistent with MANDISA/Fire Department statistics (Annexure 5.11), although fire service data indicate that most events occur during the early hours. Six respondents attributed increased fire risk to excessive alcohol consumption at these times.

Figure 5.8 Time of Day Perception of Fire Risk



Capacities

Eight residents reported that 'nothing' has been done by the government to reduce fire risk. Similarly, at community level, few examples were identified. However, at household level, respondents gave a number of examples of fire risk reduction measures. Four respondents reported that they "eat before going to the shebeen", reducing the necessity to cook after drinking (Annexure 5.12).

5.3.6 Focus on Solid Waste

Causal Factors

Interviewees identified the main cause of solid waste risk to be their location on private land. This meant that there was no street access to locate a container near their homes. This resulted in residents throwing solid waste into open areas and it could also accumulate in stormwater channels (Annexure 5.13).

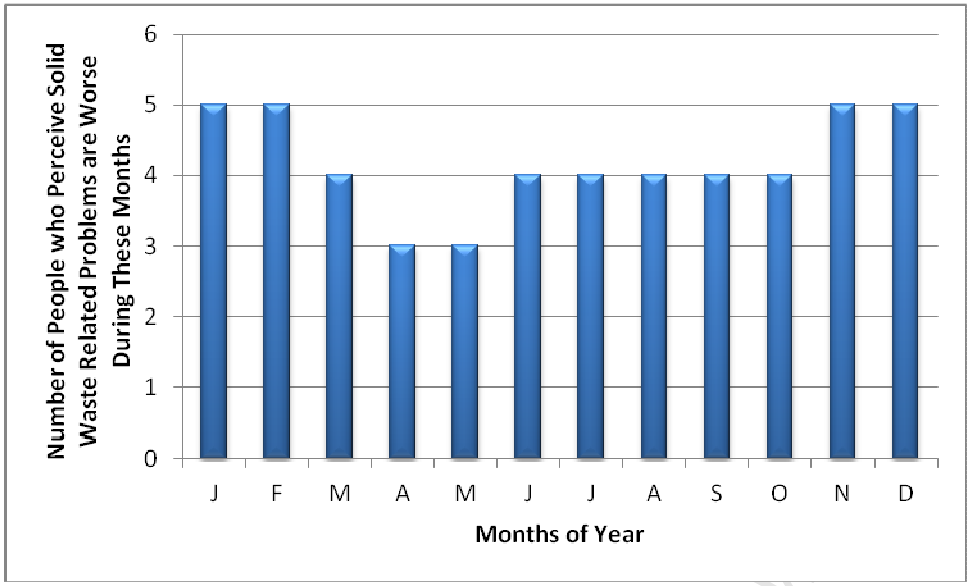
Consequences

One respondent noted that this accumulation of solid waste led to dogs 'ripping open' solid waste bags, and another reported the 'bad smell'. Interviewees stated that that this led to children and babies playing with solid waste (3) or in 'dirty drains (1) and 'flies transferring disease to homes' (1). Further effects noted by participants were rashes (3), coughing (2), diarrhoea (2) and 'feeling sick' (1). Furthermore, respondents also reported that these health problems led to other problems, such as 'taking their children to hospital' (1), 'passing rashes to other children when they sleep in the same bed' (1), and one respondent stated that solid waste caused a health problem that which meant he stopped work for six months (Annexure 5.14).

Temporal Characteristics

Figure 5.9 illustrates that most residents noted solid waste problems throughout the year, with a slight increase during hotter months. One interviewee thought this increase was 'because it's hot and the children like to play outside with the water'.

Figure 5.9 Temporal Characteristics of Solid Waste Risk



Capacities

Capacities to reduce solid waste (Annexure 5.15) are described in greater detail in Section 5.5. However, respondents reported a number of activities by the City of Cape Town's Solid Waste Department. For example, 34 interviewees noted 'people cleaning streets' (Figure 5.10). In fact, these people are residents of Sweet Home, employed by the City's appointed solid waste management contractor. Additionally, 13 participants stated that a shipping container had recently arrived to store solid waste, replacing the use of skips.

Figure 5.10 Street Cleaners

At the community level, although 3 participants mentioned that the street committee had instructed residents to deposit their solid waste in the container rather than on open land, 20 residents reported that nothing was organised by the community to manage solid waste. However, seven respondents stated that they cleaned the streets or emptied drains, and four interviewees referred to the street cleaners (employed by the city's contractor).

Residents also described household activities such as cleaning in and around their homes (5), placing solid waste in black plastic bags (17), and taking bags to open land (14) or to the container (14).

5.3.7 Consolidation of Risk Assessment Findings

Annexure 5.16 consolidates the household survey risk assessment findings for the four most significant threats prioritised by interviewees. It also helps to identify themes that cut across different urban risks experienced in Sweet Home; specifically, causal factors, consequences of risk events, or 'realised' risks, temporal characteristics and risk reduction measures adopted at governmental, community and household scales.

Respondents reported that occupation of private land was a root cause of each threat, because it resulted in a lack of service provision, such as electricity, street lighting, drainage, roads and solid waste containers. However, at the household level, excess alcohol consumption was noted as a significant factor increasing crime and fire risks.

Recurrent consequences (realised risks) were also apparent across the four prioritised risks. For instance, death and injury were noted as consequences of crime and fire events, while health problems were attributed to flood and solid waste. Although unemployment and poverty were not reported as consequences of crime, they were both noted as consequences of fire, flood and solid waste realised risks.

There were also cross themes with regard to temporal characteristics of these prioritised risks. For instance, crime, fire and flood risks were all reported by participants to increase during June and July, associated with winter conditions of reduced daylight, decreased temperature, higher winds and increased rainfall. However, consequences of solid waste were reported to increase slightly during hotter summer months, as were some forms of crime attributed to end-of-year bonuses. Fire risk presents particularly interesting temporal characteristics, and it is affected by both seasonal and behavioural factors. i.e. it increases during winter when it is colder and more windy, and during weekends and late evenings when alcohol consumption increases.

Risk management strategies for each prioritised risk varied considerably according to governmental, community and household level. Across all risks, governmental action was most noticeable in reducing solid waste risks which they did by providing a container, street cleaners and an increased number of plastic bags. While there was some evidence of residents using services provided (plastic bags and container), there was no significant evidence of any community led action to reduce solid waste risk. In contrast, community interventions were most noticeable to reduce crime, although they were mainly centred around finding criminals and seeking retribution after a criminal event rather than reducing risk. At household scale, risk reduction measures were most noticeable for fire and flood risks. Measures were a combination of 'purposive' action, such as 'eating before drinking' to reduce fire risk, and 'coping' measures, for example, building cement floors and patching roofs.

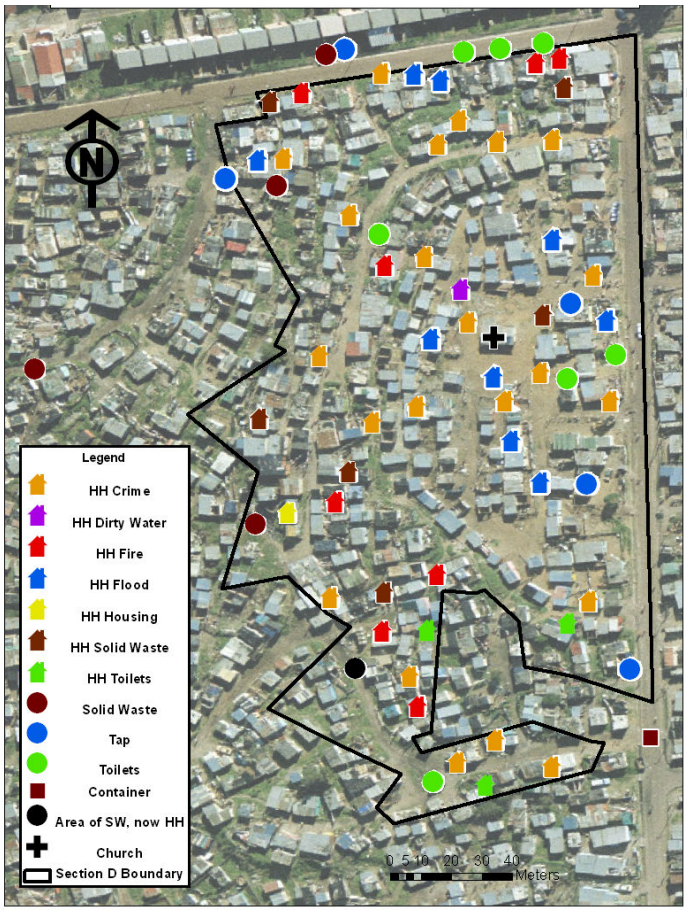
While this table illustrates unevenness in responses (i.e. house-breaking, robbery and sexual assault viewed as 'effects' of crime, rather than the crimes themselves), it helps to identify themes that cut across these four risks.

5.3.8 Spatial Distribution of Risk

The lack of service provision can be observed in Figure 5.11. Apart from three blocks of bucket toilets and a church in the centre, all taps, bucket toilets and the container are situated along the north and east boundaries. Additionally, accumulation of solid waste was located to the west in two piles, some distance from the container. The black dot, to the south west, represents an area previously used for solid waste in 2009, which is now replaced by two dwellings.

The map also plots the location of each household that participated in the survey. Each dwelling is colour coordinated to represent that household's perceived priority hazard.

Figure 5.11 Section D Household Survey Risk Map



5.4 Community Risk Assessment: Focus on Solid Waste

The household survey risk assessment findings contrast significantly with results from the community risk assessment. Results from the CRA are limited to solid waste risk because the community ranked this highest in the hazard prioritisation exercise. The full report (Arthern *et al*., 2009) is found in the DiMP archive.

5.4.1 Hazard Identification and Prioritisation

Table 5.3 presents the results from the hazard ranking exercise. It shows that of 70 votes cast by 14 residents of Section D, 25 were cast for solid waste compared with 15 for fire and 11 for environmental health.

Table 5.3 Hazard Prioritisation

Hazards	Votes per Hazard	
	Number	%
Solid Waste	25	35.7
Fire	15	21.4
Environmental Health	11	15.7
Flood	8	11.4
Tuberculosis	8	11.4
HIV/AIDS	2	2.9
Missing Slip	1	1.4
Total	**70**	**100.0**

5.4.2 Causal Factors

Participants reported that the main causes of accumulated solid waste were, that the private landowner would not allow collection facilities on his property, plus an irregular solid waste collection service. Consequently, residents placed their solid waste in open land, which could stand for many days or even weeks before collection. This led to a build up of solid waste, exposing it to a number of vectors (Annexures 5.17).

5.4.3 Consequences

As a consequence, numerous effects were generated by the CRA, distinguished between health, fire and flood effects, illustrating how solid waste can concatenate into different outcomes (Annexure 5.18). For instance, many health complaints, which were due to vector transmission and dangerous objects, could lead to loss of work and income. Additionally, participants stated that blocked stormwater channels increased the risk of flooding and contaminated water (Figure 5.12 and 5.13). Furthermore, if solid waste is not collected, residents are more likely to burn it, increasing fire risk.

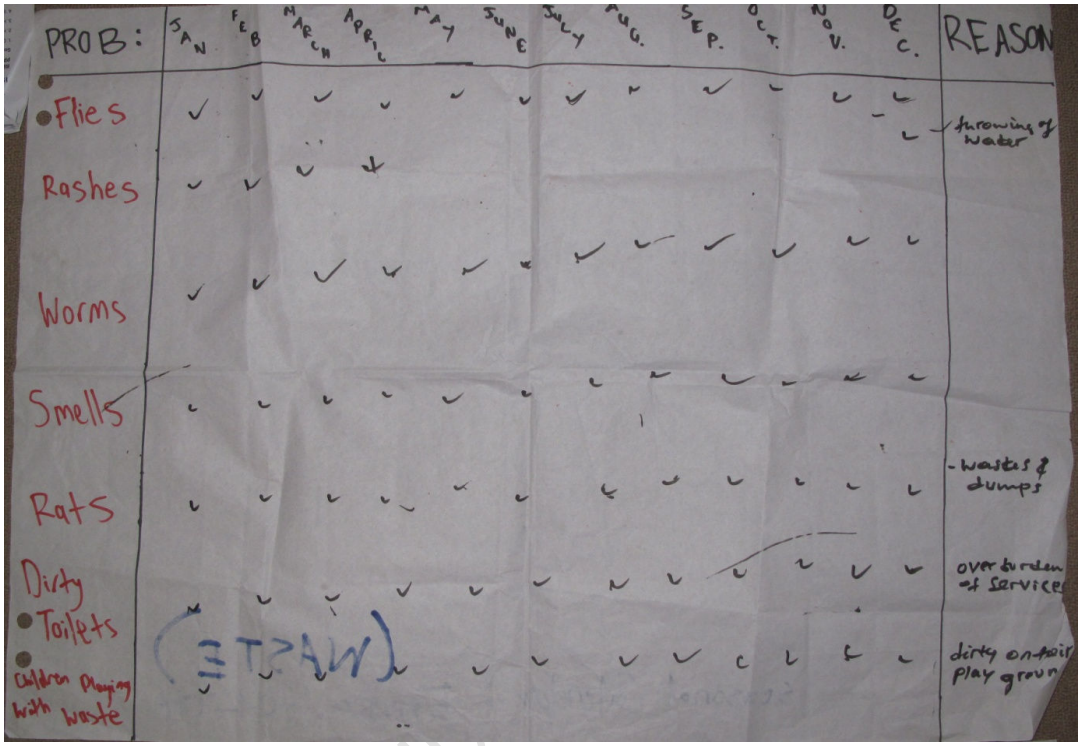
Figure 5.12 Blocked Channel Allowing Vehicular Access

Figure 5.13 Blocked Channel Causing Polluted Water

5.4.4 Temporal Characteristics

The Seasonal Calendar exercise identified temporal characteristics of solid waste reported by participants. It also identified 7 consequences of solid waste. Figure 5.14 shows that residents perceived that most effects were prevalent throughout the year, although rashes were reported to be worse during summer months.

Figure 5.14 Solid Waste Risk Temporal Characteristics



5.4.5 Risk Reduction Strategies

Solid waste management strategies reported by residents included purposive and coping interventions taken at household level, rather than governmental or community level. For example, some residents reported that they reduced solid waste by burning it, a traditional method used in the Eastern Cape, while other residents stated that they reduced their exposure by living further from solid waste dumping zones. Coping capacities included using calamine for rashes and making oral rehydration solution (ORS) to treat diarrhoea (Annexure 5.19).

5.5 Comparison of Community Risk Assessment and Household Survey Risk Assessment

5.5.1 Overview

The following section describes the similarities and differences between both risk assessment approaches, focusing on hazard identification and prioritisation, risk assessment findings, and preferences expressed by residents who participated in both risk assessments. In making these comparisons, this section will focus on solid waste.

5.5.2 Hazard Identification and Prioritisation

Table 5.4 compares prioritised hazards from the CRA with the household survey risk assessment. In both instances, solid waste, fire and flood were ranked in the top four prioritised hazards. However, there were two significant differences. Firstly, solid waste dropped from being the lead hazard in 2009 to fourth in 2010. Secondly, crime emerged as the top hazard in 2010, despite not being identified in the CRA.

Table 5.4 Hazard Prioritisation Using Cumulative Results

Hazards in Order of Priority	Community Risk Assessment	Household Survey Risk Assessment
1	Solid Waste	Crime
2	Fire	Fire
3	Environmental Health	Flood
4	Flood	Solid Waste

This change in prioritised hazards was unexpected and highlights the challenges involved in comparing results using different methodologies conducted 16 months apart, during different seasons of the year, and following developmental measures to reduce solid waste risk. Therefore, the emergence of crime as the priority hazard cannot be interpreted as evidence of a dramatic increase in criminal activity.

5.5.3 Convergence and Divergence of Risk Assessment Findings on Solid Waste

As noted previously, this thesis focuses on solid waste risk in Sweet Home. Results from both the 2009 CRA and the 2010 household survey indicate converging views regarding causal chains, realised risks and temporal characteristics. For example, both assessments identified the location of Section D on private land as a root cause of solid waste risk. However, the CRA produced greater insight. For instance, the CRA had more detail concerning the effects of solid waste than the household survey. Additionally, the CRA was able to interrogate the temporal characteristics of 7 perceived problems associated with solid waste whereas the household survey generated a more linear causal chain.

In part, the differences in results between the two methods also reflected respondents' preferences for participatory or more conventional survey methods. As eleven household survey respondents also participated in the CRA, it was possible to compare their perceptions of both approaches. Although this was a limited sample, 7 expressed a preference for the household survey, while 4 respondents favoured the CRA.

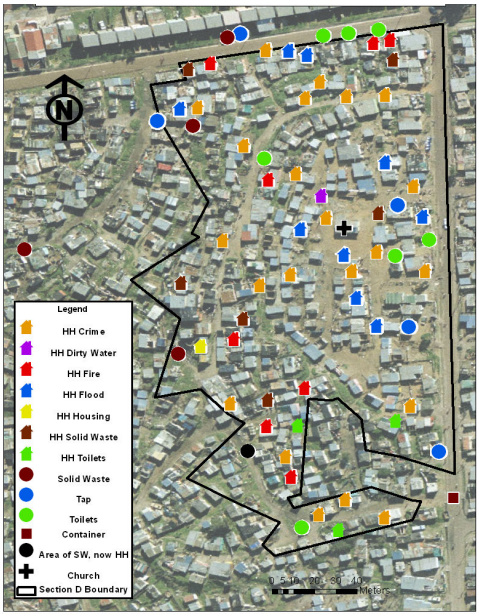
Interviewees who preferred the household survey said this was because it allowed people to think differently and provided more time to speak, as well as anonymity, and that they disliked the CRA because there were "too many people talking, and no one was listening".

On the other hand, those who preferred the CRA, gave explanations around the advantage of working together to find the answers by "reminding each other", and they disliked the household survey because there were "too many questions" (Annexures 5.20 and 5.21). This was evidenced by their short answers and negative body language.

Although an in-depth exploration of respondents' preferences for either approach was not the focus of this study, it cautions against the exclusive use of one method during a participatory risk assessment.

Similarly, from a spatial perspective, the household survey generated more data than the CRA. Figure 5.15 illustrates these differences. For instance, the household survey map provided a more clearly defined boundary and also generated more spatial data, allowing for more detailed spatial analysis.

Figure 5.15 Comparison of CRA and Household Survey Maps

Community Risk Assessment Map 2009	Household Survey Risk Assessment Map 2010
	

5.6 Community Risk Assessment as an Action Research Methodology: Findings on Changes in Solid Waste Risk

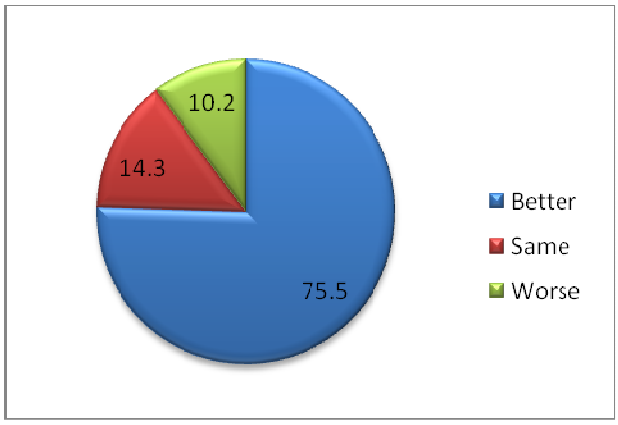
5.6.1 Overview

The third study objective was to investigate the development potential of a participatory risk assessment action research methodology through documented and observed changes in solid waste risk. This was achieved by identifying changes in solid waste risk since the CRA and the reasons for any changes.

5.6.2 Solid Waste Risk Change

Figure 5.16 shows that 75.5% of interviewees thought that solid waste risk had reduced since the CRA.

Figure 5.16 Change in Solid Waste Since 2009 (%)



Annexure 5.22 documents the respondents' reasons for solid waste risk reducing. Fifteen participants attributed this to "people cleaning the streets", nine interviewees noted that this was because of a newly installed container, and four respondents stated that it was because they received more plastic bags.

When the regularity of solid waste collection between 2009 and 2010 was compared, Figure 5.17 demonstrates that 20 interviewees thought the service had improved, while 22 stated that the service was unchanged.

Figure 5.17 Regularity of Solid Waste Collection: 2009 and 2010

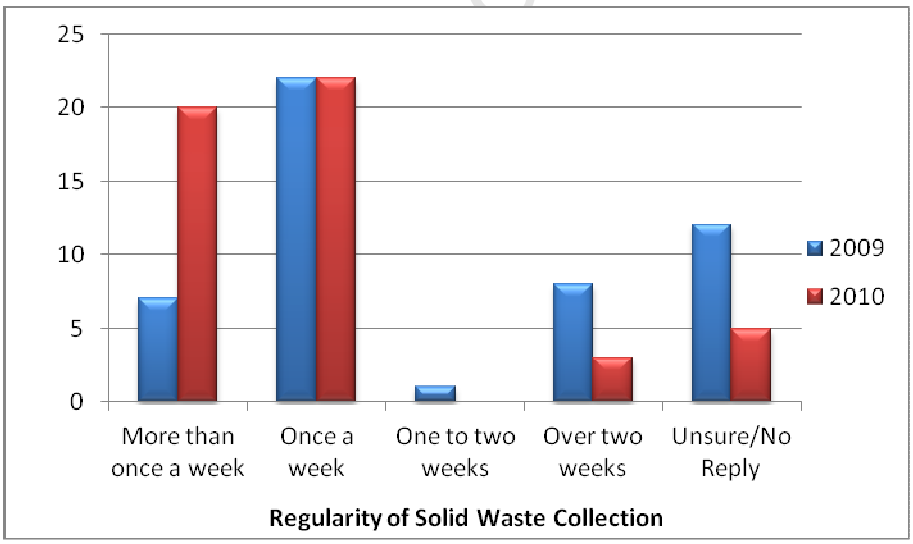
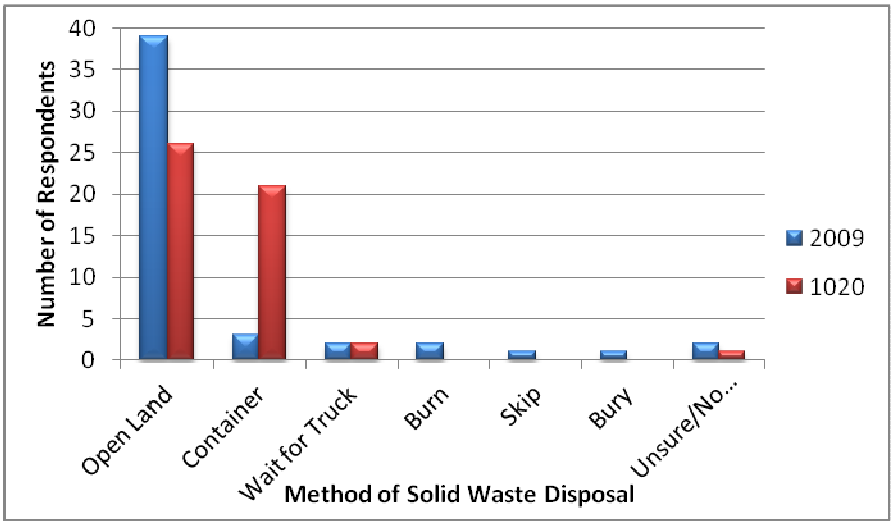


Figure 5.18 presents changes in residents' reported solid waste disposal methods. This illustrates that the number of households who take their solid waste to the container increased from 6 in 2009 to 21 in 2010. This significant change was attributed to the siting of a container close to Section D. As a result, the number of households who took their solid waste to open land was reduced from 39 to 26. However, despite this behavioural change, the majority (26) still took their solid waste to open land rather than the container. This was due, in part to the fact that the container was located to the south east of Section D, and that those living to the north of the section stated that they were told to take their solid waste to an area of open land to the north east corner.

Figure 5.18 Solid Waste Disposal Methods: 2009 and 2010



5.6.3 Action to Reduce Solid Waste Risk

Evidence presented in the preceding section indicated that there had been a reduction in solid waste risk between 2009 and 2010. The following section describes the measures and investigates their relative contributions at governmental, community and household scale in achieving this.

Governmental Action

Annexure 5.23 records how interviewees' perceived government action to reduce solid waste risk. The most frequent response, reported by 34 respondents, was 'people cleaning streets', followed by the provision of a container (13). Solid waste should be loaded in the container on a daily basis (Figure 5.19) but because this is not done, it still builds up, exposing it to the community (Figure 5.20). Four respondents thought that solid waste was collected more regularly and four reported that they received more plastic bags.

Figure 5.19 Containerised Solid Waste

Figure 5.20 Unloaded Solid Waste

While most respondents could not explain reasons for these improvements, six interviewees thought these measures commenced because community members had complained to the street committee or community leader, who spoke to the solid waste contractor about installing a container.

However, a senior manager of the City of Cape Town's Solid Waste Department reported that he was unaware of any community petitions that had influenced service delivery. Additionally, he stated that, while CRA's are "worthwhile", and provided good background information, he attributed improvements in solid waste management to best practice based on experience gathered while providing services to informal areas. He also attributed these improvements to a new contractor who was appointed in August 2010.

Community Action

Annexure 5.24 summarises how respondents perceived community activities to reduce solid waste. While 20 respondents thought that nothing had been done by the community, three participants reported that the street committee had told residents to deposit solid waste in the container rather than on open land.

Field observation and photographic evidence indicated some observable improvements in solid waste between 2009 and 2010. Annexure 5.25 presents photographic evidence taken at the same locations in 2009 and 2010. Photograph A was taken from the west boundary of Section D. The fence around the dwelling obscures the reality that the situation has not changed since 2009. However, photographs B and C (both taken at another location, but from different angles) show a very visible change. Residents explained that, following the CRA, they recognised that solid waste and toilets near a tap (not shown in the photograph) were causing health problems. Consequently, they removed the toilets and solid waste site and, to dissuade residents from dumping their waste in the same location, decided to replace the space with two new dwellings.

Household Action

Annexure 5.26 summarises interviewees' responses regarding action conducted at household scale to reduce solid waste. For instance, 17 respondents identified "placing solid waste in plastic bags" and a further 14 reported "cleaning in and around their homes" or "taking solid waste to open land or the container". Additionally, one respondent erected a sign beside a tap which asked people, "Don't dump here please", (Figure 5.21), indicating personal responsibility for public health.

Many of these findings reinforce the importance of combining the efforts of government, community and household action. For instance, the householders' agency to deposit solid waste more safely was facilitated by the City of Cape Town providing more black plastic bags and a containerised system of storage. Similarly, the City's requirement that solid waste contractors employed people from within Sweet Home to clean the streets ensured that residents were actively engaged in reducing solid waste.

However, although the majority of interviewees reported a decrease in solid waste since the CRA, apart from the instance of the replacing a solid waste site and toilet block with dwellings to dissuade depositing solid waste, residents did not attribute improvements to the CRA. Similarly, although many external stakeholders were involved, this was not

viewed as a key factor in reducing solid waste, as witnessed by the manager from City's Solid Waste Department.

Figure 5.21 'Don't Dump Here Please'

These differing observations from survey respondents and the city illustrate the challenges in attributing development change to participatory action research, even if there is observed improvement of a profiled risk, in this case, solid waste.

5.7 Summary

The household survey risk assessment approach identified similarities across different risk types. This included the cross-cutting root cause of the settlement's location on private land, which, led to a lack of street lighting, increasing the risk of crime, and no formal electricity which increased the fire risk. The household risk assessment also identified similarities across risks around consequences, and temporally, the increased likelihood risk for three perceived priority hazards in June and July.

A critical difference between the risk assessments was the hazard ranking exercise, which saw the reprioritisation of solid waste from first to fourth, and the emergence of, and priority ranking of, crime risk in the household survey. This raises the question of whether the lower rank of solid waste was due to the methods used or the improvement in solid waste management.

Lastly, the findings indicate the importance of aligning risk reduction action at governmental, settlement and household levels. In this case, the provision of a container, more plastic bags, employment of street cleaners from within the settlement and increased collection facilitated increased household agency to reduce solid waste risk.

CHAPTER 6
DISCUSSION, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

This chapter interrogates the research findings further. It begins by considering the risk profile of Section D generated by the household survey and continues by reflecting on the differences between results produced by the household survey and the CRA. The chapter then discusses the development potential of participatory risk assessment, followed by recommendations for further research and development action, followed by the conclusion.

6.2 Risk Profile of Section D

The household survey risk assessment produced results that were broadly consistent with current urban risk literature. For instance, all identified risks were chronic, recurrent processes related to everyday hazards (Pelling, 2003) and, excluding crime, all other identified hazards could be described as 'environmental' (Smith and Petley, 2009). Furthermore, results concurred with the complexity paradigm of risk, which highlights the concatenating processes between nature and society (Smith and Petley, 2009), with risks increased more significantly by societal rather than natural factors.

The survey results also highlighted the complexities of cyclicity in assessing risk. This was evidenced by data on fire risk, which was driven by a combination of temporal and behavioural factors, which varied according to season, day of week and time of day.

Moreover, the consolidation of risk assessment findings (Annexure 5.16) generated results that were consistent with the Pressure and Release Model's conceptualisation of the progression of vulnerability. This was evidenced by the identification of the settlement's location on private land as a 'root' causal factor for each identified priority hazard. These results also helped identify themes, such as risk drivers, temporal patterns and loci of control for risk reduction interventions. Similarly, the investigation into solid waste management showed that when the CoCT implemented solid waste management measures, households were encouraged to take action and reduce solid waste. This corresponds with Pelling and Wisner (2009b) who argue that disaster risk reduction works best when activities of multiple stakeholders are integrated, especially local/municipal government and urban dwellers.

6.3 Comparison of Risk Assessment Approaches

6.3.1 Comparing Assessments and Findings

The hazard identification and prioritisation activity implemented by using different assessment approaches highlighted some important findings. Firstly, both approaches generated broadly converging results despite being conducted 16 months apart and at different times of year. The finding that flooding, fire, and solid waste risks were ranked

within the top four threats in both assessments suggests that residents continue to be concerned about similar risks.

Secondly, hazards prioritised by both risk assessments diverge from those prioritised by CoCT's Disaster Risk Management (i.e. fire and flood). In this study neither of these risks was identified as the primary threat. Furthermore, the prioritisation of solid waste and crime illustrates that people are more concerned with chronic processes rooted in everyday hazards (Pelling, 2003; Burton *et al*., 1978).

The application of two risk assessment approaches also raised important methodological issues. These relate specifically to limitations around the hazard identification process, but also to strengths and constraints of each approach around depth and breadth of findings, spatial detail and respondent preference.

For instance, challenges in the hazard identification process were clear with respect to crime, which, while not identified at all in the CRA, became the priority hazard in 2010. This could have been because of a recent spate of housebreakings in Section D in the month prior to the household survey as reported by eight respondents who prioritised crime, and corroborated by the community leader and the SAPS station commander for Samora Machel. The occurrence of burglaries immediately prior to the survey would have prioritised crime as a larger threat (Venton and Hansford, 2006). In this case, another risk assessment should be conducted a few months later (*ibid*).

However, during three CRAs conducted in other sections of Sweet Home, at the same time as this study's CRA, crime was prioritised in two (Chasi *et al*., 2009; Amponsah *et al*., 2009) and co-prioritised by female participants in another (Davis *et al*., 2009). Moreover, according to the DiMP project manager, crime is commonly prioritised by other CRAs conducted in other informal settlements and a field officer for CoCT Disaster Risk Management also thought that crime was the largest risk in Sweet Home.

It is possible this anomaly was due to one of the disadvantages of "group work" because some people dominat, while others remain silent (Jupp, 2007; Pretty *et al*., 2005), resulting in coercion (Pretty *et al*., 2005; Greenwood and Levin, 2007) and a subsequent lack of consensus-based decision-making.

While the prioritisation, if not the identification, of crime risk can be explained by recent housebreakings, the deprioritisation of solid waste risk appears to have been influenced by various solid waste risk reduction measures. These issues around hazard identification and prioritisation highlight the dynamic nature of risk, emphasising the need for regular risk assessments.

The consequences of hazard non-identification could have a crucial impact on risk management, i.e. if a risk is not identified, it cannot be analysed, let alone addressed. Therefore, although authors (Phuyal, 2003; Chambers, 1994; Mercer *et al*., 2008) argue that a facilitator's attitude and behaviour is more important than the application of tools, this study suggests that the application of tools, such as hazard identification, requires more research. This observation is corroborated by the lack of critical literature on PLA tools, particularly with regard to participatory risk assessments. Additionally, this inconsistency also emphasises the importance of triangulation of sources, methods and outputs (IFRC, 2007b; Pretty *et al*., 1995). Furthermore, semi-standardisation would also benefit monitoring, evaluation and impact assessments (Neefjes, 2003).

6.3.2 Risk Causation, Consequences and Seasonality

With regard to generating insights on risk causation, consequences and seasonality, this study found that although results were broadly similar, the CRA produced a greater depth of understanding around solid waste, while the household survey created a greater breadth around a number of different risks. This difference was partly because the CRA focused on one hazard, while the household survey assessed a number of risks. However, the increased knowledge provided by the CRA could also be explained by its ability to produce richer data and greater understanding than traditional social science research (Cooke, 2008; Mercer *et al*., 2008) due to its capacity to elicit a greater range of experiences more quickly, and additional insights revealed following disagreements that emerge during discussion (Pretty *et al*., 1995).

A further difference concerned the level of detail each approach generated through spatial representation. While the maps produced by both risk assessment were not contradictory, the advantage of using GIS in the household survey was its ability to combine attribute data with spatial data, allowing for additional spatial analysis. For instance, the household survey risk map (Figure 5.11) illustrated that even within a small area there was visible spatial distribution of perceived priority hazards. Also,, while crime risk was evenly distributed throughout the section, flood risk was clustered in the central wetland area and to the north, both on low lying ground. Furthermore, no households in the wetland area prioritised fire. However, despite the advantage of this type of spatial analysis, it does not negate the value of community mapping, which can be combined via PPGIS (Kemp, 2008).

6.3.3 Comparing Risk Assessment Preferences

Both methods also generated useful insights around respondent preferences for one method or the other. The finding that some interviewees preferred the household survey (often for reasons of privacy and anonymity) over the CRA is consistent with critiques of participatory methods, which place a strong emphasis upon group-based learning (Henkel and Stirrat, 2001). Conversely, interviewees who preferred the CRA did not engage so readily with the household survey. This suggests that, although respondents took part or 'attended' both risk assessments, they may have 'participated' more fully with their preferred approach. This reinforces current views that attendance is not synonymous with participation (de Dios, n.d.; IFRC, 2007a).

These differences imply that for a risk assessment to facilitate participation from as broad a representation of a settlement as possible, it should seek to find appropriate environments where participants feel comfortable and are able to express their opinions without fear of retribution, whether it is in a community meeting, focus group or household (ALNAP, 2003). Secondly, it is necessary to identify the best tool that enables participants to express themselves as fully as possible, for example, surveys, interviews or visual methods.

Lastly, the CRA findings were coarse when compared to those generated by the household survey. This is because the CRA was conducted quickly (two days) and viewed the 'community' as a single unit of analysis, an issue raised by IFRC (2007b) and Pelling (2007), whereas the household survey was carried out over four weeks at household scale.

This study suggests that despite the significant difference in the time taken to conduct each risk assessment, the CRA produced richer data than the household survey. van Riet (2009) agrees, arguing that surveys should be used only to supplement qualitative data collection and should not be the main method of data acquisition. His finding that qualitative data collection takes less time also concurs with the findings of this study and is likely to reduce financial and human resource inputs.

6.4 Development Potential of Participatory Risk Assessment

The post-CRA meeting allowed residents to share their concerns and establish contacts with government departments, an important contribution raised by Brock (2003) and Clemente, (2003). However, findings from this study show limited evidence that the CRA had been instrumental in effecting developmental change.

At the settlement scale, there was no evidence of any official community organised action, influenced by the CRA, to reduce solid waste. Explanations for this centre around the process itself and the lack of political support in this specific case-study. It is important to recognise here that DiMP is not an NGO, and therefore does not have a mandate to implement risk reduction projects also, it has limited capacity to follow up communities' progress in risk reduction (Edelstein, 2010).

The literature recognises that participatory research can be effective in knowledge creation, whilst also acknowledging that it does not automatically lead to change which would enable people to rise above their differences and conflicts and alter radically the existing power structures (Malik, 2003; Mosse, 2001; Greenwood and Levin, 2007; Francis, 2001) that may be 'part of the problem' rather than 'part of the solution' (IFRC, 2006).

This could be because, as Francis (2001) noted, the critical units for decision-making and action are individuals, households, and groups rather than communities (Francis, 2001), or because the CRA was done rapidly, making it less likely to significantly alter power relations (Guijt, 2003; Greenwood and Levin, 2007). It could also be attributed to the lack of pro-active local political support. In a similar CRA conducted in Kosovo informal settlement (DiMP, 2009b), the councillor was very supportive of the CRA. He had the CRA report translated into isiXhosa and presented to 500 community members, who subsequently instigated risk reduction measures (Edelstein, 2010).

However, in Sweet Home, the non-attendance of either the community leader or councillor in the CRA or post-CRA meeting signalled limited political support for community change. According to Edelstein (2010), community based organisations and residents have struggled to collaborate with an unsupportive councillor and community leader in Sweet Home. Moreover, the SAPS commander reported that community progress had been hampered by infighting and tension between political parties. These two differing outcomes illustrate and emphasise the need for political support in order to achieve developmental change (Kohler *et al*., 2004).

These explanations highlight challenges in applying participatory methodologies under politically constrained conditions. They also emphasise the need to identify ways of involving community members in the important processes of dialogue and analysis in knowledge creation, and linking that knowledge to political structures with the aim of

enabling local people and communities to take control of their own development (Kapoor, 2002; Mercer *et al*., 2008).

Despite explanations for the lack of organised mobilisation at community level to reduce solid waste, findings clearly showed that interventions by the CoCT to improve solid waste management, most of which occurred following the CRA, were also matched by increased engagement by households, leading to the significant reduction in solid waste risk. While these actions were not directly attributed to the CRA, conversely, it also does not mean that implicit learning did not take place as part of a CRA collective learning process, which influenced these improvements, examples being various household actions and the *ad hoc* community action to position dwellings on a previous solid waste site.

6.5 Recommendations

This study and its results highlighted specific areas for additional research, methodological improvement and field application. For instance, the dramatic ranking differences of crime by both assessment approaches underlines the need for more research on the hazard identification activity. This constitutes a core activity in virtually all contemporary participatory risk assessment approaches. Yet findings from this study suggest closer scrutiny of this widely applied method to ensure it generates robust and reliable results.

Similarly, study findings indicate the need for adjustments in CRA approaches, for example, incorporating a household survey into the hazard identification and ranking exercise. This could help to reduce domination by more vocal or powerful members of a community (Pretty *et al*., 1995) and give a voice to shy and more marginalised members. (von Kotze and Holloway, 1996; Kohler *et al*., 2004).

For these same reasons, the incorporation of a household survey format could be used, where appropriate, to supplement a participatory risk assessment. This could facilitate increased participation by a broader section of the community, augment participatory risk assessment findings, and could also be used to cross-check results, thereby triangulating sources, methods and outputs and increasing the robustness of risk assessment results (Pretty *et al*., 1995). However, because of the additional resources (financial, temporal and human) required to conduct household surveys, and the constraints often placed upon practitioners (van Riet, 2009), careful consideration should be given to how these are employed.

Bearing resource constraints in mind, this study illustrated that the use of GPS readings and GIS, such as Google Earth, provide a convenient and helpful tool to analyse spatial distribution of priority hazards and community resources.

This case study also illustrates the crucial role political support plays in risk reduction. Despite restrictions placed upon an academic institution in this regard, making the crucial link between knowledge created by a risk assessment and the implementation of risk reduction actions could be increased by facilitating greater participation of settlement residents in the post-CRA meeting, so that they play a key role in the analysis, planning and action, in partnership with government departments, contractor service providers, local leadership and NGOs to find ways of working together to reduce urban risks.

6.6 Conclusion

This study sought to compare the respective contributions of participatory action research and household survey research methods to inform understanding of informal settlement risks as well as the impact of PAR in effecting developmental change. This was achieved by examining urban risk in Section D of Sweet Home Farm informal settlement in the City of Cape Town, through the lenses of community risk assessment and household survey methodologies, conducted sixteen months apart.

The household survey generated a risk profile of Section D, created by a combination of historical, political, social, economic, geographical and meteorological factors similar to those experienced by many of the city's informal settlements situated on the Cape Flats. Both risk assessments profiled a greater concern with chronic "everyday" threats (Pelling, 2007) such as solid waste and crime rather than more severe "realised risks" like large fires and flooding, which are prioritised by local government for the city's informal settlements. This stresses the need for risk reduction based upon local assessments rather than generic, city-scale, assumptions about risk driving processes.

The survey also detected a number of cross-cutting risk drivers, for instance, Section D's occupation on private land as a "root cause" of all its priority risks rather than environmental or meteorological risk drivers. It also identified cross-cutting temporal and behavioural factors that increase risks, such as fire and crime risk. These underline the central role of human rather than natural drivers that increase risk. Such findings are consistent with prevailing urban risk literature that emphasises the role of social vulnerability and political marginalisation, rather than natural conditions, in driving risk in poor communities (Pelling and Wisner, 2009).

The study also interrogated areas of convergence and divergence and strengths and weaknesses of these ideologically and methodologically different approaches. Despite convergence on many levels, the emergence of crime as the priority threat in the household survey raises important questions about the uncritical application of PAR tools, such as hazard identification. These have become formulaic and routinised, placing too much confidence in the automatic application of tools or methods (Brock, 2003; Pretty *et al*., 1995). This is corroborated by the lack of critical literature on PLA tools, particularly with regard to participatory risk assessments.

With respect to causation, consequences and seasonality, both approaches produced broadly converging results. However, findings from the CRA were found to be richer than the household survey, providing greater depth of understanding due to the additional insights that emerged during group discussions (Cooke, 2008; Mercer *et al*., 2008, van Riet, 2009; Pretty *et al*., 1995). This is an important factor when undertaking risk assessments under financial, temporal and human resource constraints (van Riet, 2009).

However, while group learning is often held as the 'key' to ensure participation (Chambers, 1997; Kohler *et al*., 2004; Kapoor, 2002) and tends not to employ traditional "extractive" research methodologies, this study found that the appropriate use of questionnaires could enhance participation. This was particularly evident for 'shy' and marginalised members who appreciated the privacy and anonymity provided by the household survey. In addition, the study also illustrated the benefits of using spatial tools, such as GPS and Google Earth, to enhance spatial analysis of risk assessments.

With respect to the final question on the capacity of PAR to effect developmental change, the study findings are inconclusive. Evidence from the household survey, field observations, and conversations with residents showed that there has been a marked improvement in solid waste management during the 16 month period between the two assessments. However, neither respondents nor key informants attributed this to the CRA.

Apart from one example of *ad hoc* action, there was no evidence of any organised community activity to reduce solid waste. This could have been due to the rapid time frame of the CRA that discouraged full engagement by participants (IFRC, 2007b) as well as a lack of local political support. This underlines the need to translate knowledge created by a risk assessment into the development process by engaging residents in the analysis, planning and implementation process (ProVention, n.d.; Chambers, 1997; Kohler *et al*., 2004). It also illustrates the importance of political support to achieve positive outcomes (Kohler *et al*., 2004).

The study indicated, in fact, that the improvement in solid waste management was due to a complementary effort between local government and individual households. While this was not directly attributed to the CRA, the timing of these interventions suggests that it may have played an enabling implicit role.

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Annexure 2.1 Widely Used Frameworks for Interpreting Disaster Risk

Pressure and Release Model

In this approach, 'root causes' describe the underlying causes of vulnerability. These are far removed, both physically and in time, from 'unsafe conditions' and are usually economic, political and social, affecting allocation of resources and power. 'Dynamic pressures' are processes that translate root causes towards unsafe conditions. 'Unsafe conditions' are specific forms in which vulnerability is expressed in time and space relative to the hazard (Wisner *et al*., 2004). The 'release' aspect conceptualises the release of pressure necessary to reduce vulnerability and disaster risk (*ibid*).

The PAR has significantly influenced the disaster risk discourse by changing the focus from the hazard to the acknowledgement of the importance of vulnerability. Its strength is its simplicity: in understanding and recognizing that the deepest causal factors may be quite remote from the disaster event itself (Nathan, 2005). However, it has been criticised for being too simplistic in explaining the complexity of risk, for not acknowledging the relationship between society and the hazard (Cutter *et al*., 2008; Arthern, 2000), for not recognising the capacities of people to reduce risk (Cannon *et al*., n.d.) and for being unable to measure vulnerability without a great deal of data collection and analysis (Twigg, 2001).

The Model of Vulnerability

The Model of Vulnerability particularly focuses on the components of environmental risk. It shares similarities with the PAR as it also originates from a political ecology perspective, with its focus on the root causes of environmental problems (Benjamin, 2008). However, it differs from the PAR model in that it recognises the role of people's capacities to reduce disaster risk by differentiating vulnerability into three components: exposure, resistance and resilience. Moreover, it incorporates factors that increase the magnitude and frequency of the natural hazard, with 'human induced global environmental change' as the root causes of hazard intensification.

Sustainable Livelihoods Approach

Livelihood security is enhanced by the more diverse strategies a household is able to employ, especially if they are sustainable. A household's livelihood is considered to be sustainable when it can cope with stresses, recover from shocks and maintain or enhance its assets without negatively affecting its natural resources (Beall and Schütte, 2006).

Authors acknowledge that SLA has made an important contribution to contemporary understandings of vulnerability (Pelling, 2003; Adger, 2006) and vulnerability analysis (Cannon *et al*., n.d.). For example, Allen (2003) and de Satgé (2002) argue that vulnerability to disasters can only be fully understood and addressed through considering everyday livelihoods. Others suggest that the approach presents a good opportunity to integrate risk reduction into development (Benson and Twigg, 2008) and gives equal weight to vulnerabilities and capacities. However, Twigg (2001) suggests that SLA is more useful for research purposes and would require simplification to be used for

community projects. He also cautions against assuming that greater assets automatically reduce vulnerability.

Capacities and Vulnerabilities Analysis

The significant difference and contribution of CVA is the weight given to people's motivation and attitude. This is a central theme in the CVA, which suggests that individual action is strongly related to recognition of capacity to act and sense of social responsibility to do so (Burton *et al*., 1978). For example, following a disaster, if people see themselves as 'victims' they are more likely to remain passive, waiting for assistance. However, if they see themselves as being 'affected', or a 'survivor', they may behave differently by choosing to help themselves (IFRC, 2007a). This is related to the conscientisation of people who do not see themselves as suffering, but active, with the ability to change their environment (Davids, 2009).

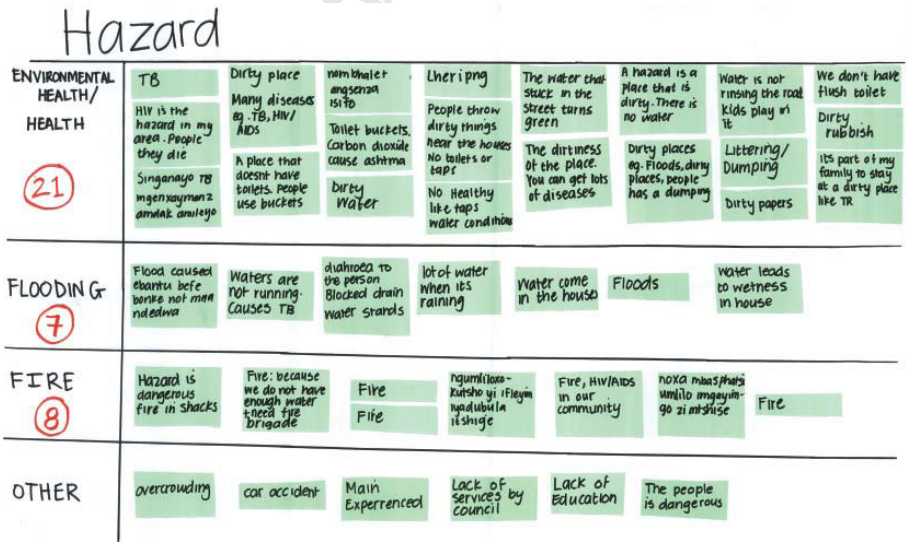
Annexure 2.2 Participatory Risk Assessment Tools

Ranking

Ranking can be used to prioritise different hazards or solutions. An example being a hazard identification and ranking activity in which participants write down hazards or problems experienced in their area. These are then put into clusters. Participants 'vote' for the hazard they see as most important by putting stones into different cups which represent the different hazards.

Holloway and Roomaney (2008)

In the following example, environmental health is seen as the biggest issue, followed by fire and flooding (Holloway and Roomaney, 2009).



Holloway and Roomaney (2008)

Ranking and/or scoring can also be used to find out the degree to which different hazards affect people, property, community resources, infrastructure, and other elements of the community. A rank or score is given to each disaster to ascertain the effects of each on their community according to criteria that participants formulate and agree on (de Dios, n.d.).

For example, hazards can be evaluated according to set criteria (e.g. occurs every year, occurs every month, occurs seasonally, occurs once in a lifetime) and assigned a value (IFRC, 2007a).

The following example ranks the threat posed by different hazards to different items as, agreed by the group.

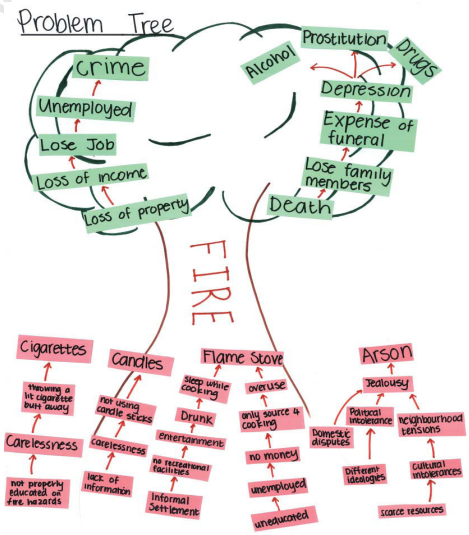
Parts of the house	Wind	Fire	Earthquake	Volcanic eruption	Floods
Roof – zinc	3	2	3	1	1
Ceiling	2	5	1	1	1
Windows – wood	5	5	2	1	1
Doors	2	2	2	2	2
Drainage	5	1	1	1	5
Walls	3	3	1	1	3
Floor	1	4	1	1	3
House base	1	1	2	1	1
Trees around the house	5	5	1	1	1
Road	5	1	3	1	3

IFRC (2007a)

Problem Tree

Although not used as widely, the problem tree can be a very effective tool to identify the relationships between the causes (roots) and effects (branches) of a hazard. It is useful for hazard impact chain analysis and for understanding the causes and factors which increase vulnerability.

The output is a diagram of a tree with the causes represented by the roots and the effects represented by the branches. The following example displays the causes and effects of fire in an informal settlement.

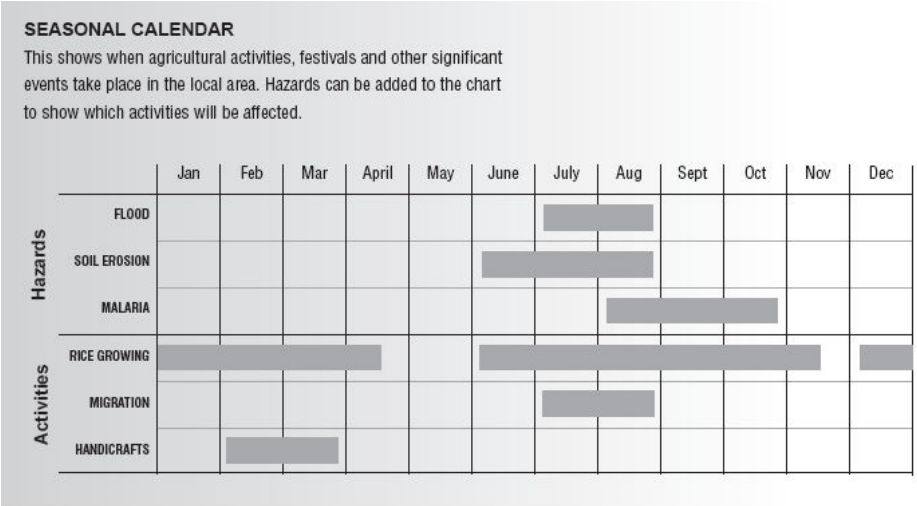


(Holloway and Roomaney, 2008)

Seasonal Calendar

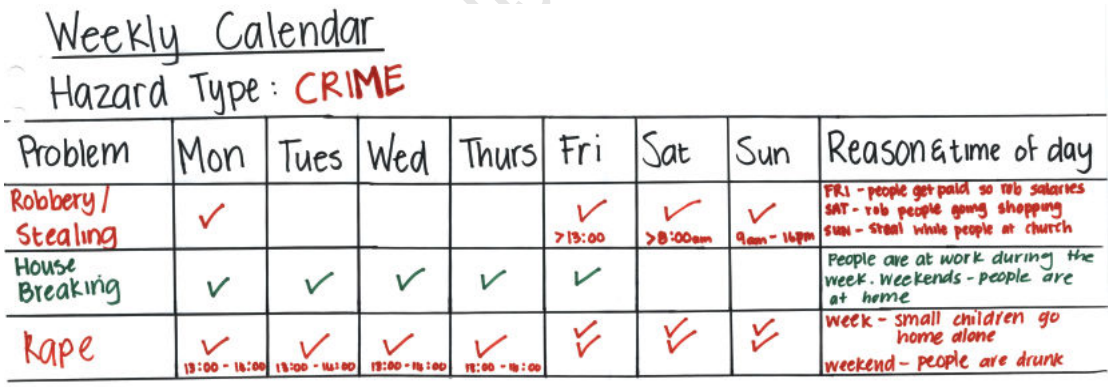
The seasonal calendar is used to identify when a risk is most likely to happen and the reasons for its occurrence. Rather than looking at specific events, it seeks to understand the frequency and trends of risk.

It can be used to show when hazards and disaster events occur, seasonal activities (harvesting), public events (carnivals, holidays and festivals) (Abarquez and Murshed 2004; IFRC, 2007a). It can also be used to assess how people cope with disasters and seasonality by diversifying livelihood strategies (de Dios, n.d.).



Venton and Hansford (2006)

Using the same method, one can also learn when hazards occur during shorter periods (in the following case, a week), and why.



Holloway and Roomaney (2008)

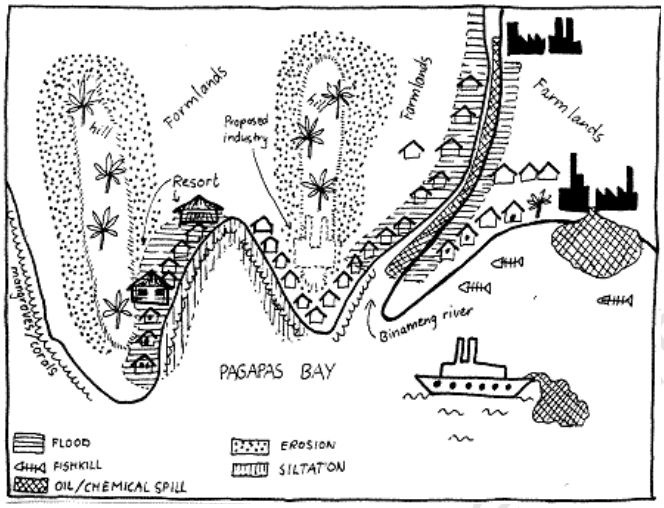
Mapping

The aim of settlement mapping is to map the location of dwellings, resources and areas of greatest risk within a community, as well as assets which can reduce risk. It is drawn by residents of the community based on their knowledge about the location (Holloway and Roomaney, 2009). Mapping is useful for visually representing:

- physical attributes, resources and services (for example, clinics, schools, water sources, shelter and other infrastructure)

- hazards (for example, in informal settlements, dirty areas or unsafe areas due to crime and places where fires occur)
- areas at particular risk, such as those prone to floods or health hazards, and people or groups who are particularly vulnerable to those hazards.

(Abarquez and Murshed 20004; de Dios, n.d.; IFRC, 2007a)



Heijmans and Victoria (n. d.)

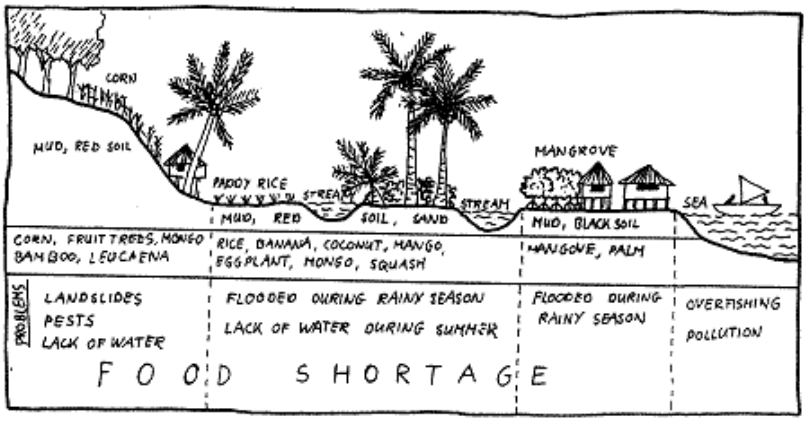
Transect Walk

As the settlement map can be quite rough, it should be followed up by a transect walk through the community. The object of a transect walk is to build upon insights gained from previous exercises, observe conditions that increase or decrease risks, and informally interview residents.

A transect walk involves taking a predetermined route through a settlement to identify different hazards, the areas and people exposed and/or vulnerable to hazards, the factors that increase or decrease risk and the resources that could be used to reduce risk (economic, agricultural, open spaces, house). This involves observation, note taking, photographs and informal interviews with residents about their experience of risk (Venton and Hansford, 2006; Abarquez and Murshed, 2004).

A transect walk can either be guided by the community mapping activity conducted earlier (Holloway and Roomaney, 2009) or be carried out before the whole process in order to get an overall idea of the area to be assessed.

Example: Pook Paliparan, Dasmariñas, Cavite, Philippines

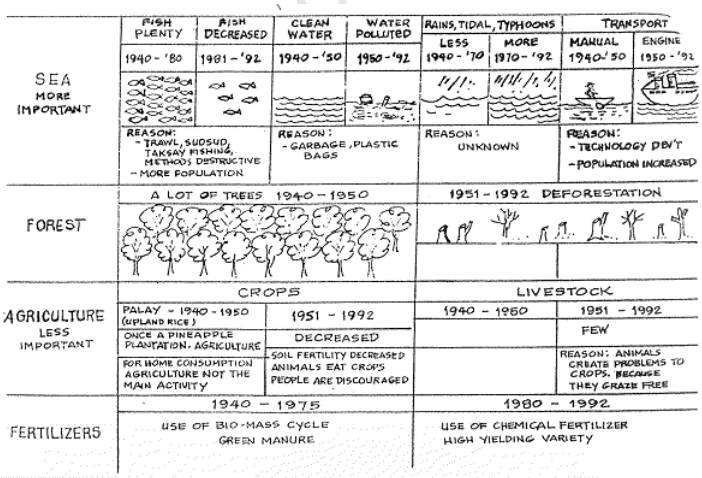


Heijmans and Victoria (n.d.)

History Time Line

Historical time lines help in understanding disasters and significant events in the past and the factors (such as hazard and vulnerability drivers) that led to them as well as their impact on the community (livelihoods, environment etc.) which aids understanding of the present situation. An example would be understanding the differences between a pre-disaster and post-disaster situation (Venton and Hansford, 2006; Abarquez and Murshed, 2004). They can also help to track changes in the environment and in community behaviour and shed light on causal links (IFRC, 2007a).

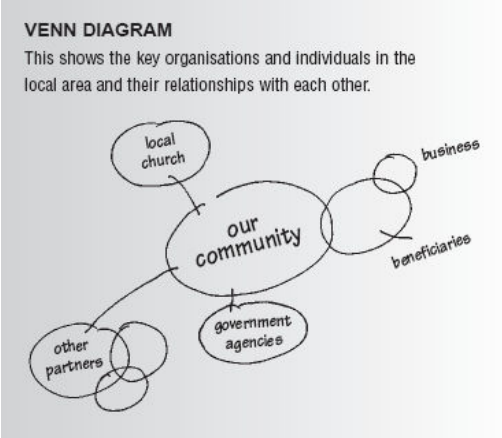
Example of historical profile of a coastal village in Southern Philippines



Heijmans and Victoria (n.d.)

Venn Diagram

Venn diagrams identify organisations or significant people both within and outside the community, assess how important they are to the community and the level of engagement between the community and these people/organisations with reference to disaster risk (de Dios, n.d.; Holloway and Roomaney, 2009). This exercise can stimulate heated debate because it is discussing power relationships and the expectations between the different actors.



Venton and Hansford (2006)

Focus Groups

Outside knowledge is useful as it provides external or scientific knowledge, which should be balanced with local knowledge (Pelling, 2007).

Annexure 2.3 Examples of Participatory Risk Assessment Approaches

Organisation	Full Title	Short Title	Author
Asian Disaster Preparedness Centre	Participatory Disaster Risk Assessment	PDRA	Abarquez and Murshed (2004)
Action Aid	Participatory Vulnerability Analysis	PVA	Chiwaka and Yates (n.d.)
Care	Climate Vulnerability and Capacity Analysis	CVCA	Dazé *et al*. (2009)
Oxfam	Participatory Capacities and Vulnerabilities Assessment	PCVA	de Dios (n.d.)
Citizens' Disaster Response Network	Hazard, Vulnerability and Capacity Assessment	HVCA	Heijmans and Victoria (n.d.)
DiMP	Community Risk Assessment	CRA	Holloway and Roomaney (2008)
International Federation of Red Cross and Red Crescent Societies	Vulnerability and Capacity Analysis	VCA	IFRC (2007a, 2007b)
Tearfund	Participatory Assessment of Disaster Risk	PADR	Venton and Hansford (2006)
	Community-Based Risk Assessment	CBRA	von Kotze and Holloway (1996)

Annexure 3.1 Number of Dwellings in Sweet Home Farm between 1993 and 2010

Year	No. of Dwellings	Estimated Population*
1993	52	165
1996	373	1,186
1998	886	2,817
2002	1,480	4,706
2003	2,217	7,045
2004	1,785	5,676
2005	1,706	5,425
2006	1,974	6,277
2007	2,005	6,376
2010 (Nov)	3,148#	10,011

(Abbott and Douglas, 1999; ARG Design, 2006; CoCT, 2005; Rodriques *et al*., 2006; Adlard, 2008; CoCT, n.d. a).

* The only identified reference for the population of Sweet Home was for 2003; the average household size was 3.18. Population estimates for other years are based on this average household size.

(pers com. This figure was provided by the head of the City of Cape Town's Solid Waste Department following a dwelling count conducted by their contractor in November 2010)

Annexure 4.1 Stages in Research Process

Stages	Purpose	Methods and Procedures	Sources
Preparatory work for field research and data collection	Background research (development and risk profile)	• Secondary research • Compile photographs and GPS readings from 2009 CRA	• UCT Library • DiMP Resources • Fire Department • Cape Town Disaster Risk Management • Internet
	Prepare data collection tools	• Household survey • Focus groups • Key informant interviews	• Weathering the Storm • Risk assessment literature • Section D CRA
	Secure permission for access to site	• Consult local NGO	• The Warehouse
	Locate translator/field research assistant	• Consult local NGO	• The Warehouse
	Pilot test survey and make alterations	• Interview 10 households	• Section D
Primary data collection	Household survey	• Conduct 50 household surveys • Take GPS reading for survey participating households • Take GPS readings of resources and areas of risk.	• Section D
	Changes in solid waste risk since 2009 CRA	• Conduct 50 questionnaires • Key informant interviews • Photographs • GPS readings	• Section D • The Warehouse • Community Leader • Cape Town Disaster Risk Management • Fire Department • Solid Waste Management • South African Police Service
	Interviewees perceptions of both risk assessments	• Question interviewees who had participated in both risk assessments	• Section D
Data Consolidation	Consolidation of household survey	• Excel and statistical software package • Plot locations of households in GIS	• Household survey • GPS readings • Excel • SPSS • ArcView GIS
	Changes in solid waste risk since 2009 CRA	• GPS readings plotted on ArcView GIS • 2009 and 2010 photographs matched where possible	• Questionnaire • Photographs • GPS readings • Excel • SPSS • ArcView GIS
	Interviewees perceptions of both risk assessments	• Summarise interviewees replies	• Household survey
Data Analysis	Compare result from CRA and household survey	• Conduct comparative analysis	• CRA • Household survey • Key stakeholder interviews
	Changes in solid waste risk since 2009 CRA	• Descriptive analysis	• CRA • Household survey • Key stakeholder interviews
	Interviewees perceptions of both risk assessments	• Summarise interviewees replies	• Household survey

Annexure 4.2 Sweet Home Farm Community Risk Assessment in 2009

Each group was assigned a leader who was resident in Sweet Home and who acted as an important source of local knowledge and link with the community, plus one or two members of DiMP staff, to ensure the activities were carried out correctly. The community leader assigned to our group lived in another section and did not know many people from Section D. However, she was very effective at assembling a group of 20 to 25 people which represented male and female adults of varied ages. For each activity, some participants would leave and new participants would take their places (Arthern *et al*., 2009).

On day one, the following exercises were completed: hazard identification and ranking, problem tree, seasonal calendar, risk mapping and transect walk.

Residents drew a map of Section D that was quite rough. Therefore, during the transect walk, the CRA team took GPS readings of the boundary, resources (taps, toilets and a church) and solid waste hazard sites. These were plotted onto ArcView GIS.

On day two, facilitators and community leaders from each CRA group met with external stakeholders from many government departments that work in Sweet Home, for example, environmental health, water and sanitation, fire, South African Police Service (SAPS), plus two NGOs. The facilitators and community members presented their findings from the CRAs, which prompted a discussion around the problems raised and how they could be resolved.

A recurrent theme was the lack of permission from the private land owner for the City to provide basic services enjoyed by residents on the City-owned land in Sweet Home. Moreover, external stakeholders also expressed problems due to lack of resources and integration between departments, which inhibited development.

Annexure 4.3 Applicative Adjustments Between Participatory and Non-Participatory Approaches

Risk Assessment Tool and Purpose	How Method is Applied in CRA	Adjustments to CRA Method for Purposes of Household Survey
Hazard Identification and Prioritisation Identify hazards affecting the community and the hazard that is of greatest concern.	Twenty three participants identified the primary hazards within the settlement. To prioritize the hazards, each identified hazard was written on a cup. Participants were then given five paper strips each, and asked to place them in each cup according to which hazards they thought were most important in their community. The votes were tallied and totals recorded beside each hazard, and the top hazard noted. Their priority hazard was solid waste.	Each interviewee was asked to name three hazards that affect them, their family or household, although not each interviewee could state three hazards. They were then asked to rank their hazards in order of concern, 1 being the priority hazard, and so on. The interviewees' priority hazard was used as the focus for the rest of the HRA.
Problem Tree Chain of Causation The objective of the problem tree is to identify the causes and effects of a hazard by understanding the progression of vulnerability to worsen conditions, plus the direct and knock-on effects of the hazard.	Participants were asked what they thought were the main causes of solid waste. Each cause was written on a slip of card and attached to the 'roots' on the diagram. For each 'main cause', participants were asked what causes it, or why it happens. The answers were placed below the main cause. The same question was asked for each underlying cause until root causes were found. The similar process was used to identify the effects of solid waste, where the effects were represented as branches. And for each 'main effect', participants were asked the knock-on effects until all effects were discussed. Participants discussed the progression within the root causes and the effects, and also the relationship between causes and effects. Participants considered how these causes and effects affected individual households and the entire community.	Whereas the CRA focused solely on solid waste, each household survey focused on the respondent's own priority hazard. Similar to the CRA, each interviewee was asked to state the main causes of their priority hazard. For each main cause, they were asked what they thought were the causes and subsequent root causes. Similarly, interviewees were asked what they thought were the main effects of their priority hazard, what that lead to and the eventual effects.
Seasonal Calendar Seasonality/Cyclicity The objective of the seasonal calendar is to identify when a risk is most likely to happen and the reasons for its occurrence. Rather than looking at specific events, it seeks to understand the frequency and trends of risk. Depending on the risk, this may be according to time of year, month, week, day, or time of day.	CRA facilitators drew a chart listing the months of the year in columns and the problems (or 'effects', identified during the problem tree exercise) associated with solid waste in rows. An additional column was added on the right to write the reasons for the high risk at that time. Participants discussed when each problem was most prevalent throughout the year and indicated this with a cross under the relevant month. For months when the effects were more acute, two or three crosses were marked on the chart. Participants then discussed and wrote down the reasons why people thought the effects were more serious at that time of year.	A very similar process was used for the household survey. It differed however, in that it looked a broader group of hazards, according to the interviewees' priority hazard. Additionally, depending on the priority hazard, seasonality was investigated at additional levels. For instance, fire was investigated according to month of year, day of week and time of day. Moreover, because of time restrictions, seasonality was only investigated according the cyclicity of events rather than the effects of the risk.

Risk Assessment Tool and Purpose	How Method is Applied in CRA	Adjustments to CRA Method for Purposes of Household Survey
Settlement Mapping Spatial The objective of settlement mapping is to map the location of dwellings, roads and services, the areas of greatest risk and the resources to reduce risk.	On a large sheet of paper, a small number of participants mapped Section D of Sweet Home Farm. With an aerial image of the settlement as a guide, they indicated the placement of houses, roads, services and solid waste risk sites on the map.	It was not feasible to conduct a settlement map with each household survey participant. Therefore, the settlement map was composed after the transect walk. Refer to the Transect walk (below) for details. Data were drawn on a digital map, using ArcView GIS. Each household was drawn with a colour according to the hazard prioritised by that household's interviewee.
Transect Walk The object of a transect walk is to build upon insights in previous exercises, by observing conditions that increase or decrease risks, and informally interviewing residents.	Objectives were established for a walking tour of Section D, to visit the main solid waste sites and community assets. The community guide and a small number of participants led the CRA facilitators through the settlement. Facilitators observed, photographed, took notes, recorded on a map and took GPS readings of resources and areas of risk. They discussed problems and experiences associated with solid waste by the residents. Facilitators also sought to identify risk avoidance and coping strategies carried out by group action or individual households. This was conducted by carrying out short interviews with a few residents concerning solid waste risk.	During the CRA transect walk, facilitators interviewed a few residents about risk avoidance or coping strategies employed by groups or households to reduce solid waste related risk. The same questions were asked as part of the household survey questionnaire. Additionally, GPS readings were taken of the section boundary, resources (taps, bucket toilets, solid waste container, church), hazards, and the location of each interviewees dwelling. Moreover, photographs were taken of community and household risk reduction measures and factors that increased other risks, such as fire or flood.

Annexure 4.4 Household Survey Risk Assessment Questionnaire

House No.	
Location (GPS)	
Date	
Gender of Interviewee	

Vulnerability and Capacity Indicators

Human Capital

1. Sex of head of household? Male [ ] Female [ ]

2. Marital Status of head of household?

Single		Divorced	
Married		Widowed	

3. Age of head of household? _____

4. Where are you from? _____

5. How many people live in your home? _____

6. Age of family members (number of family members within each age group)

0-5	6-15	16-20	21-30	31-45	45-60	60 plus

7. How secure do you feel to stay in your home for as long as you want?

Very secure		A little insecure	
Quite secure		Very insecure	

8. Level of education of each adult

Level	No. Adults	Level	No. Adults
No Education		Matriculation	
Primary		Diploma	
Secondary		Degree or above	

9. Number of household members with a disability? ___

10. Number of household members with long-term illness? ___

11. Do any household members have a drinking problem? Yes [ ] No [ ]

12. How happy do you feel about the future?

Very much		Not much	
Some		Very little	

13. In the past four weeks, did you worry that your household would not have enough food? Yes [ ] No [ ]

14. If 'yes', how often did this happen?

Rarely (once or twice)		**Some times** (3-10 times)		**Often** (over 10 times)	

15. How many adult members are working? ___

16. Employment status of each adult?

Permanent		Self-employed		Unemployed	
Temporary/Casual		Retired		Disabled/cannot work	

Financial Capital

17. What is your average household monthly income from social grants?

Social Grant	Rand	Social Grant	Rand	Social Grand	Rand
Child support		Care dependent		Disability grant	
Old age pension		Grant-in-aid		Social relief	

18. What is your average household monthly income from other sources?

R0 to R250		R501 to R750		R1,001 to R2,000	
R251 to R500		R751 to R1,000		R 2,0001 +	

19. Is your income regular each month? Yes [ ] No [ ]

20. If 'no', which months have the lowest income?

Months of year with lowest income											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

21. Why is income lowest then?_____

22. How much does your household normally spend each month?

Items	Rand	Items	Rand	Items	Rand
Rent		Household items		School fees	
Food		Social		Health care	
Clothes		Cell phones		Savings	
Transport		Fuel/electricity		Debts	

23. Which months do you normally spend more?

Months of year with highest expenditure											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

24. Why do you spend more in these months?_____

Social Capital

25. Do any household members belong to any groups?

Political		NGO	
Church/Mosque		Other:	

26. Do you feel part of your community? Yes [ ] No [ ]

27. Do you g*et al*ong with your neighbours? Yes [ ] No [ ]

28. Do you trust people in your community? Trust [ ] Don't trust [ ]

29. How safe do you feel in your community?

Very safe		Unsafe	
Safe		Very unsafe	

30. Do you receive any help from the following?

Family		Local leaders		Community organisation	
Friends/Neighbours		NGO		Shopkeepers	
Church/Mosque		Government		Other:	

Physical Capital

31. How many rooms do you have? ____

32. What things does your household own that are used to earn money?

1		3	
2		4	

33. Sources of energy?

	Legal electricity	Informal electricity	Paraffin	Charcoal/wood	Candle	Gas
Cooking						
Heating						
Light						

34. What type of toilet do you use?

Own toilet		Bucket	
Flush toilet		Open area	

Natural Capital

35. Do you own land or have access to common land? Yes [ ] No [ ]

36. If 'yes', please give details? _____

Risk Assessment

Hazard Identification and Prioritisation

37. Think about the hazards that affect your household. Which three hazards concern you most? Prioritise them in order of concern (1 = greatest).

Hazards	Prioritise Hazards

Hazard (Specify) _____

38. How is the risk from this hazard now compared with the start of last year?

Better		Same		Worse	

39. Why do you think that is? _____

Causes and Effects of Prioritised Risk

40. What are the main causes of disaster events? For each of these main causes, what causes them? What are the root causes?

	Main causes of problem	Causes of main causes	Root causes
1			
2			

41. What are the main effects of disaster events, and what do they lead to?

	Main effects of problem	Secondary effects	Eventual Effects
1			
2			

Seasonal Calendar

42. For each main effect, tick months when they are the worst and the reasons?

	Main Effects	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Reasons
1														
2														

43. For each main effect, tick the days when risk is worst and the reasons?

	Main Effects	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Reason
1									
2									

44. For each main effect, tick times when risk is worst and the reasons?

	Main Effects	Midnight to 4am	4am to 8am	8am to Midday	Midday to 4pm	4pm to 8pm	8pm to Midnight	Reason
1								
2								

Capacities Analysis/Solid Waste Risk Change

45. What has been done by external organisations to increase or decrease risk?

What has been done?	Who?	When?**(SW only)**	Why?**(SW only)**	How good?

46. What has been done by the community to reduce the risk problem?

What has been done?	Who?	When?**(SW only)**	Why?**(SW only)**	How good?

47. What does your household do to reduce the risk problem?

What has been done?	When?**(SW Only)**	Why?**(SW only)**	How good?

Attitudinal Capital (Vulnerability and Capacity Indicators)

48. How much do you think the community believes it can reduce the risk?

Very much		Not much	
Some		Very little	

49. How much do you believe your household can reduce the risk?

Very much		Not much	
Some		Very little	

Risk History

50. Have you experienced risk related events in the past? Yes [ ] No [ ]

If 'yes' answer questions 51 to 54. If 'no' answer questions 55, 56, 54

51. Please specify events

Event	Year	Month	Day of Week
1			
2			
3			

52. What was the extent of your loss?

	Damage/Loss	Costs (Rand)
Event 1		
Event 2		

53. When you experienced events, did you need external help? Yes [ ] No [ ]

54. If 'yes', who helped you and what type of help did you receive?

Source of Support	Type of help	Source of Support	Type of help
Family		Employer	
Friends/neighbours		Church/Mosque	
NGO		Government	

If 'no', answer the following questions

55. If you experienced an event, would you need help? Yes [ ] No [ ]

56. If 'yes', complete table, above, of whom you would seek help from?

Solid Waste Risk

Solid Waste Risk Changes

57. What was your priority hazard in March last year? _____

58. How do you mainly dispose of your solid waste in 2009 and this year?

	Open land	Skip	Container	Burn	Bury
2009					
2010					

59. How often is solid waste collected in 2009 and this year?

	More than once a week	Once a week	One to two weeks	Over two weeks
2009				
2010				

60. How is the solid waste problem now compared with last year?

Better		Same		Worse	

61. Why is this? _____

Questions 62 to 66 do not need to be answered if answered in HRA

Solid Waste Risk Capacities Analysis

62. What has been done by government or outside organisations to increase or decrease solid waste?

What has been done?	Who?	When?	Why?	How good?

63. What has been done by the community to reduce solid waste?

What has been done?	Who?	When?	Why?	How good?

64. What does your household do to reduce solid waste?

What has been done?	When?	Why?	How good?

Solid Waste Risk Attitudinal Analysis

65. How much do you think the community believes it can reduce solid waste?

Very much		Not much	
Some		Very little	

66. How do you believe your household can reduce solid waste?

Very much		Not much	
Some		Very little	

Comparing CRA with HRA

67. Did you take part in the CRA last year? Yes [ ] No [ ]

If 'yes', please answer the following questions:

68. Questions comparing CRA with HRA:

Question	CRA	HRA	Why?
Which did you enjoy more?			
Which was better at describing the risk problem?			

69. What did you learn? _____

70. How would you like to change it? _____

Additional Questions if Time

71. On the map, mark places where solid waste has increased or decreased.

72. Has Section D been affected by the following during the last 3 years?

	Fire	Flood	Solid Waste	Crime	
2008					
2009					
2010					

Annexure 4.5 Guide for Key-Informant Interviews

Name	
Position	
Organisation	
Location	
Date	

1. Which hazards are a problem for Section D?

Hazard	**Prioritise Hazards**

2. What was the priority hazard last year? _____
3. Why?_____
4. How is the risk posed by solid waste now compared with one year ago?

Better		Same		Worse	

5. Why?_____
6. Can you identify on the map places where solid waste has increased or decreased due to action by external agencies or the community?
7. What is their main method of solid waste disposal?

	Open land	Skip	Container	Burn
2009				
2010				

8. How often is solid waste collected?

	More than once a week	Once a week	One to two weeks	Over two weeks
2009				
2010				

9. How much do you think the community believes it can reduce solid waste?

Very much		Not much	
Some		Very little	

10. How do you view the community's ability to reduce solid waste?

Very much		Not much	
Some		Very little	

11. What has been done by government or outside organisations to increase or decrease solid waste?

What has been done?	Who?	When?	Why?	How good?

12. What has been done by the community to reduce solid waste?

What has been done?	Who?	When?	Why?	How good?

13. Was the CRA effective in helping you understand risk in Sweet Home?

14. If 'yes', how? _____

Annexure 4.6 Field Observation Guide

Fire	***Flood***	***Solid Waste***
• Dwelling construction • Distance between dwellings • Vehicular access • Illegal electrical connections • Presence of solid waste/ wood/ carpets between dwellings	• Proximity to areas prone to flooding • Dwelling construction • Presence and condition stormwater drains • Presence of solid waste and blockages in stormwater drains	• Solid waste collection system (bags, skips, containers) • Presence of solid waste next to or accumulating beyond capacity of solid waste storage • Presence of solid waste in open spaces

Annexure 4.7 English and isiXhosa Definitions

Term	English	isiXhosa
Disaster Intlekele	A serious disruption of a household, community, ecosystem or society that leads to hardship, damage or property loss and that is too difficult for those affected to manage without outside help.	Ku xa bethetha ngophazamiseko olumandla kumakhaya, ekuhlaleni, kuluntu nendalo ngokubanzi, oluthi lukhokelele kumonakalo, nakwilahleko engamandla. Loo nto ithi inyanzelise abo bachaphazelekayo bafune uncedo
Risk Umngcipheko	The chance of harmful effects occurring due to the interaction between a hazard and vulnerable conditions.	Iimeko ezibeka ukhuseleko ebungozini
Hazard Ubungozi	Things or processes that may have dangerous or harmful effects on people and the environment.	Izinto okanye iimeko ezinokukhokelela kudodobalo lwendalo okanye ukhuseleko loluntu
Vulnerability Isichenge	Internal conditions that increase people's exposure and susceptibility to hazards or other shocks and stresses.	Yimeko ngelinye ixesha engaqapheleki msinyane eyenza kube lula ukugaxeleka ebungozini

Holloway and Roomaney (2008:102,103)

Annexure 5.1 Socio-economic Demographic Profile

Comparing 2010 data for Section D and 2003 data for the whole of Sweet Home, Annexure 5.1a identifies similarities and differences. For instance the average household size and the most common household size are broadly similar. Additionally, a similarly high proportion of the population originate from the Eastern Cape. However, there were two significant differences. In 2003 the majority of household heads were female, whereas in 2010 the majority were male. Furthermore, the number of married household heads changed from 10% in 2003 to 55% in 2010.

Annexure 5.1b compares education levels between 2003 and 2010. This shows that the overall level of education has increased over these seven years; for instance, those with secondary education had increased from 38.5% in 2003 to 50% in 2010.

Health statistics show that the percentage of households with a member with either a disability or a long-term illness remains about the same, i.e. 20% of households in 2010 compared with 22% in 2003 (ARG, 2006).

A Comparative Demographic Data for 2003 and 2010

	2003 Sweet Home Farm (ARG, 2006; CoCT, 2005)	**2010** Section D
Average household size	3.2	3
Most common household size	2 and 3	2, 3 and 4
Percentage from the Eastern Cape	95%	98%
Percentage of households with one person	11%	10%
Majority gender of one-person households	Male	Female (3)
Majority gender of head of household	Female	Male (76%)
Percentage Married	10%	55%

B Comparative Educational Data for 2003 and 2010

	2003 Sweet Home Farm (ARG, 2006)	**2010** Section D
No Education	4.1%	3%
Primary (to Grade 7)	49.4%	33%
Secondary	38.5%	50%
Matric or higher	8%	14%

Annexure 5.2 Causes of Crime Risk

Root Causes	**Causes**
Unemployment (18)[7]	Poverty (3)
Private land (2)	No street lighting (2)
Drugs and Alcohol (3)	They want to get brave enough to attack people
Police close shebeens (1)	*Shebeen owners lose income (1)*
Peer pressure to take drugs, family problems (1)	Young people who don't want to go to school

[7] The figures in brackets denote the number of respondents who reported this fact

Annexure 5.3 Consequences of Crime

Main Effects	Secondary Effects	Further Effects
House breaking (18) Robbery (11) Rape (3)	Injury (5) Death (5)	Stress, fear and shock, which can lead to illness

Annexure 5.4 Capacities: Action to Reduce Crime Risk

Government	Community	Household
Nothing (13)	Nothing (6)	Nothing (12)
Police Patrolling (5)	Call Police (8)	Burglar gate (3)
Closing shebeens by 8pm. When police leave, they reopen (1)	People find out who has done crime (5) People arrest criminals (1) If community find criminal, they ask him to return stolen goods (2) Beat robber (2) Kill criminals. This reduces crime (2) We wanted to kill someone, but we are scared to kill someone now (1)	Tells husband to come straight home from work (1) Come into house earlier (1)
Closing shebeens has increased crime (1)	Sometimes community patrols, but they are not organised (1)	Call the police (2)
	I can do nothing alone, only with community (1)	Pray before I sleep (1)
		Call for help (1)

Annexure 5.5 Causes of Flood Risk

Root Causes	Causes
Situated on wetland (2). People know beforehand, but they have no choice because it is the only place available. Excessive rain (2) No drains (1)	Flood water rises through floor (4)

Annexure 5.6 Consequences of Flood

Main Effects	Secondary Effects	Further Effects
Breathe in dirty water (3)	Flu and colds (3), coughing and fever (4) and headache (1)	Cannot look for work (1) Visit to clinic (1) and hospital (1)
Damaged clothes (3), furniture (2) and carpet (1)	Temporarily move while water subsides (2)	While away, dwelling contents stolen (1)

Annexure 5.7 Capacities: Action to Reduce Flood Risk

Government	Community	Household
Nothing (7)	Community asked truck drivers who live there to bring truck loads of rubble (1)	Mixed cement and sand, laid around edge of home and under whole floor (1) Cement on floor (1) Mix soil and sand (1)
Given plastic for roof (2)	Nothing (8) without permission of councillor (1)	Plastic, zinc sheets and patches for roof (1)
		Move furniture to prevent it getting damaged
		Bucket to catch water (1)
		We change room for a few days until it subsides (1)
		Live with sister until it subsides

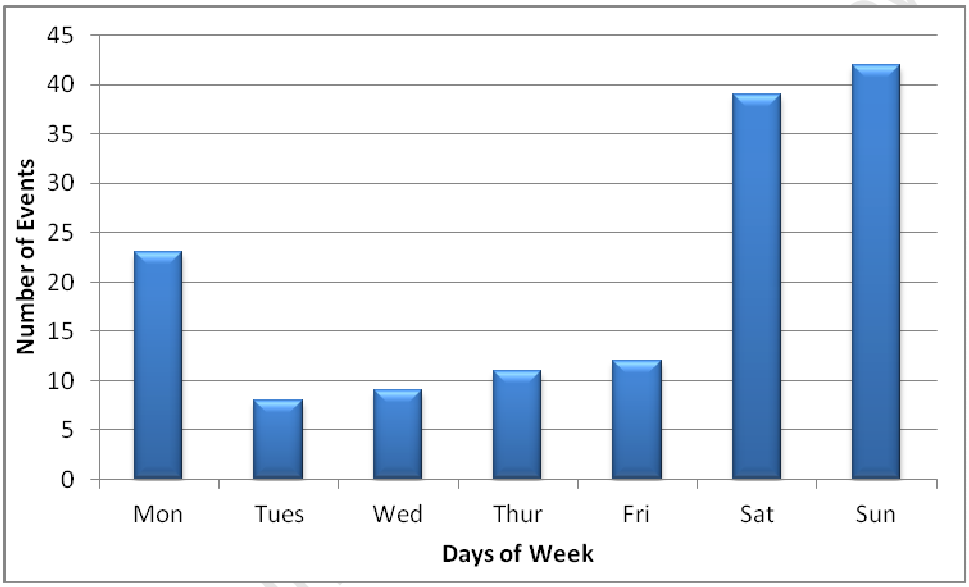
Annexure 5.8 Causes of Fire Risk

Root Cause	Causes
Because Section D is situated on private land, many people have no electricity (4) People drink alcohol (4)	People use paraffin and wood for cooking and heating (4) On return from shebeen, people cook food. While cooking, they fall asleep, leaving stove unattended and fires start (4)

Annexure 5.9 Consequences of Fire

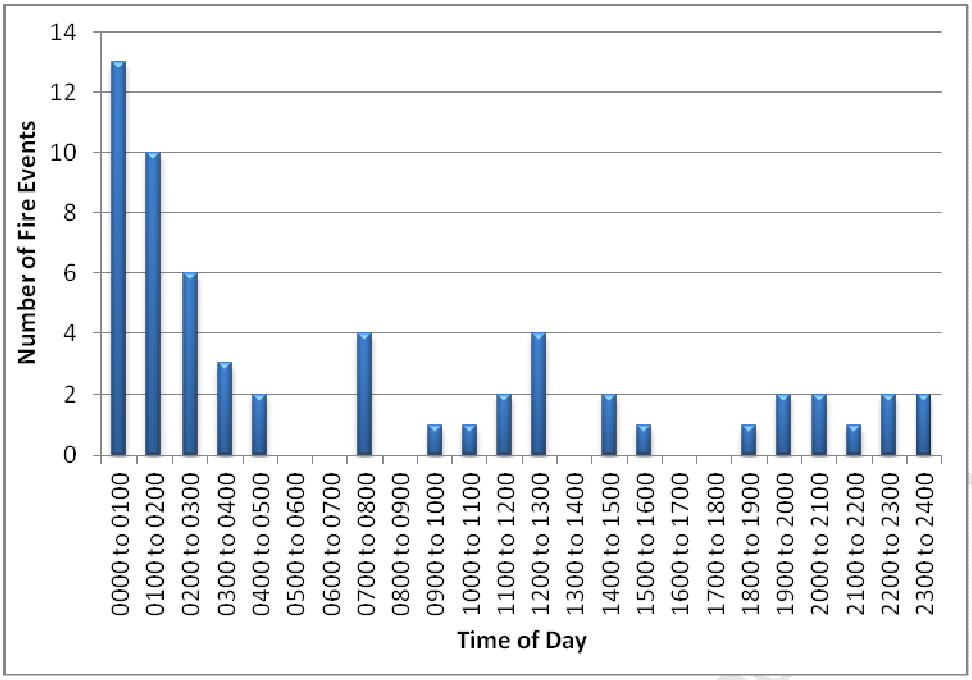
Main Effects	Secondary Effects	Further Effects	Eventual Effects
Loss of identify documents (ID) (5) Loss of house (7) and contents (4) Death and injury (3)	Time consuming to replace ID (3) Cost of recovery	Hard to get work	Poverty

Annexure 5.10 Fire Events in Sweet Home Farm According to Days of Week, Between August 1997 and July 2010



(MANDISA, n.d.; CoCT Fire and Rescue Department, n.d.)

Annexure 5.11 Fire Events in Sweet Home Farm According to Time of Day, Between January 2005 and July 2010



(MANDISA, n.d.; CoCT Fire Department, n.d.)

Annexure 5.12 Capacities: Action to Reduce Fire Risk

Government	Community	Household
Nothing (8)	Nothing (5)	Eat before going to the shebeen (4)
	Closing shebeen earlier (1)	Nothing (2)
	If there's a fire, people work together to put out fire (1)	Use electric now instead of paraffin (1)
	The street committee told the community to stop burning wood, but they only stopped for two weeks (1)	Cook earlier in the evening because it is less windy (1)

Annexure 5.13 Causes of Solid Waste Risk

Root causes	Secondary Causes	Causes
No street access for container	No container nearby People say container is too far	People are still putting solid waste in street (open area), not container (3) People do not care about other people, only the area in front of their homes
	People throwing bags on streets	Solid waste gets into drains

Annexure 5.14 Consequences of Solid Waste

Main Effects	Secondary Effects		Eventual Effects
Dogs ripping open bags (1) Bad smell (1)	Children and babies playing in solid waste (3) Babies playing in dirty drains (1) Flies transfer disease to homes (1)	Rashes (3) Coughing (2) Diarrhoea (2) Feel sick (1)	They lose energy, take children to hospital They pass rashes to other children when they sleep in same bad Stopped work for six months

Annexure 5.15 Capacities: Action to Reduce Solid Waste Risk

Governmental	Community	Household
Street cleaners (34)	Nothing (20)	Put solid waste in plastic bag (17)
Provision of shipping container (13)	Cleaning the street or emptying drains (7)	Take solid waste to open land (14)
Nothing (8)	Street Cleaners (4)	Take solid waste to container (14)
Solid Waste collected more regularly (4)	Community say you must put solid waste in bag and container, not on ground (3)	Clean their yard (8)
More black plastic bags (4)		Clean area in front of home (5)

Annexure 5.16 Consolidation of Household Survey Risk Assessment

Perceived Threat	Vulnerability						Temporal/Cyclicity		Capacities		
	Causal Chains			Consequences							
	Root Causes ⇒	Secondary Causes ⇒	Tertiary Causes ⇒	Primary Effects ⇒	Secondary Effects ⇒	Eventual Effects ⇒	Higher Risk	Reasons	Government	Community	House hold
Crime	Unemployment Police close shebeens Private land	Poverty Drugs Alcohol Shebeen owners lose income No street lighting	Used before committing crime	Housebreaking Robbery Rape	Injury Death Loss of possessions	Stress Fear	June, July November December	Shorter days End of year bonuses	Police patrolling. Closing shebeens by 8pm. When police leave, they reopen	Call police Community locate criminals and conduct local retribution Community patrols	Burglar gates Return home earlier Call police Pray
Flood	Situated on wetland Excessive rain Private land	No drainage	Seepage	Breathe dirty water Damaged clothes, household items	Flu, colds, coughs, fever Temporarily move (stolen contents)	Visits clinic, hospital Cannot look for work	June, July	Higher rainfall	Given plastic sheeting	Truck loads of rubble	Reduce seepage with sand, cement Patch roof Move furniture
Fire	Private land	No formal electricity Alcohol Homes built of flammable materials	Use flammable paraffin Cooking after drinking	Loss of ID, home, contents Death, injury	Time-consuming replacing ID Replace possessions	Hard to get work Poverty	**Months** June, July **Days** Friday Saturday **Time** 8pm to midnight	More fires because cold Alcohol Alcohol	Nothing	Closing shebeens earlier Told not to burn wood Work together to extinguish fire	Eat before going to shebeen Use electricity instead of paraffin
Solid Waste	Private land No street access for container	Container too far	Throw solid waste in open land	Dogs rip open bags Flies, dogs, rats, children transfer disease	Rashes Coughs Diarrhoea	Visit clinic, hospital Lose work	Throughout year Slightly higher during hotter months		Street cleaners Container More regular collection Plastic bags	Cleaning streets Community told to take solid waste to container	Use plastic bags Take solid waste to container Clean yard

Annexure 5.17 Causes of Solid Waste

Root causes	Secondary Causes	Main Causes
Private land owner does not allow skips or other waste collection facilities on his property	Irregular collection of solid waste by contractor. Residents reported that it had not been collected since February	Waste piles up inside and outside people's homes

Annexure 5.18 Effects of Solid Waste

	Main Effects ⇒	Secondary Effects ⇒	⇒	⇒	Final Effects ⇒
Health	Bags of solid waste ripped open by dogs and rats, exposing it In addition to leftover food, solid waste also included barbed wire, jagged metal and other dangerous objects	Dogs and rats disperse solid waste Dogs come in contact with people, especially children Rats nibbling people's feet when they are asleep Flies lay eggs in solid waste, and transmit diseases Maggots infesting people's homes	Direct contact: Children access solid waste to play with it or eat leftover food Researchers observed a boy eating a leftover apple core Indirect contact: with dogs, rats, flies and maggots	Residents are exposed to health risks. They complained of rashes and stomach pains, which are particularly common amongst children Contact with building materials, barbed wire, jagged metal and other dangerous objects can lead to typhoid and other infections	Children lose days at school Lose days at work Loss of income Spend more on medicine
Flood	Solid waste collects in stormwater channels causing blockages in stormwater channels and drains	Increases risk of flooding Contaminates water	Flood events Health problems		
Fire	If solid waste is not collected regularly, people are more likely to burn their solid waste	Smoke from burning solid waste can produce noxious fumes		Contact with noxious fumes contributes to respiratory ailments and mild brain damage	
	Waste collects between dwellings	Increased build up of flammable material (particularly wood) between dwellings that are densely spaced, drives spread of fire from one dwelling to another			

Arthern *et al*. (2009)

Annexure 5.19 Capacities: Action to Reduce Solid Waste Risk

Risk Reduction Capacities	Coping Capacities
Burn solid waste Only taking solid waste to the dump when the truck comes Building homes further from solid waste dumping sites Those who live nearer solid waste dump sites close their windows and doors to avoid bad smells, flies, and worms	Treat rashes with calamine Treating diarrhoea with oral rehydration solution (ORS) Journeys to clinic for more serious complaints, which 'is very far'

Annexure 5.20 Reasons Respondents Preferred the CRA or Household Survey

CRA	HRA
I like to help the community	People are thinking differently
Too many questions	More time to speak because last year there were too many people. I like these questions more
If you forget to mention something, someone else may remember	Students did not spend enough time talking to people as a group
Asking questions to many people. Too many for one person	Lot of people talking together. Now, it is easier to answer questions
	For security reasons. It's anonymous
	Talking to me alone. No one knows what I'm saying
	So you can see the damage in our houses

Annexure 5.21 Reasons Respondents Thought the CRA or the Household Survey was More Effective

CRA	HRA
You can't help alone, but if you are a community it can be better	People are thinking differently
Too many questions	Students did not have enough time to ask questions
Equally good	Equally good
	During CRA, everyone was talking, no one was listening
	For security reasons. It's anonymous

Annexure 5.22 Reasons for Solid Waste Improvement

Reason for Improvement	Number of People who Gave Reason
People cleaning streets	15
Container	9
We have plastic bags, but didn't last year/more plastic bags	4
Solid waste collected more regularly	3
People cleaning around their own homes	2

Annexure 5.23 Activities by the Government or Outside Organisations to Reduce Solid Waste Risk?

What?	No.	Who?	No.	When?	No.	Why?	No.	How Effective	No.
People cleaning streets	34	Council	10	2008	1	People complained to leader or councillor	1	0	1
				Dec 2008	1				
		Community	1	2009	12				
		Government	4	2010	1	Community complained to street committee	1	1	3
				Jan 2010	3				
				Feb 2010	1	Don't know	17	2	7
		Don't know	3	March 2010	1			3	7
Container	13	Council	4	2009	1	We went to councillor to ask for containers	1	1	1
				Feb 2009	1				
		Government	1	2010	1	People complained to leader or councillor	1	2	4
				Jan 2010	3	Leaders went to council to ask for containers	1	3	5
		Don't know	1	Feb 2010	3	Don't know	7		
				Don't know	1				
Nothing	8								
Solid waste collected more regularly	4	Council	2	2009	1	Community complained to street committee	1	1	1
		Don't know	1	Jan 2010	2	Don't know	3	2	1
Given more black plastic bags	4	Council	1	2010	2	Because I have a shop	1	2	1
								3	1
People collecting solid waste	1	Council	1	Feb 2010	1	Don't know	1	3	1
Truck comes to collect solid waste	1			2009				2	1
Don't know	1								

Annexure 5.24 Activities by the Community to Reduce Solid Waste Risk?

What	No.	Who	No.	When	No.	Why	No.	How Effective	No.
Nothing	20								
People are cleaning and picking up solid waste from street	4			2009	1	Because the streets are still dirty	1	2	1
During weekends, when cleaners not working, people clean streets	2			End of 2008	1	Because street very dirty	1	2	2
						Street cleaners don't work during weekends	1		
When drains are full, we empty them, put solid waste in black bags and take to open area	1			Jan 2010	1	Because we saw it was dirty, because the street cleaners are not cleaning the streets properly	1		
Street cleaners are from Section D	3								
People collecting solid waste	1								
Community say you must put solid waste in bag and container, not on ground	3	Street committee	2	Every year	1	Because it's the World Cup and we may have visitors	1	2	2
				2009	1				
				Jan 2010	1	We want our community to look clean	1		
We went to councillor to ask for container	1	Community	1	2008		Because people put solid waste in open space and no one collected it	1	3	1
Community leader reported solid waste problem to council	1	Community leader	1	Jan 2010		Community was very dirty	1		
People cleaning around their homes	1					When Government sent street cleaners			
People put solid waste in black bag	6							2	1
								3	1
People know where to put solid waste	1								
People place solid waste in open area/land	4			Mar 2010	1	Didn't do that last year because we didn't have plastic bags	1		
People take solid waste to container	3								

Annexure 5.25 Observable and Documental Changes in Solid Waste: Sweet Home

	2009	2010
A		
B		
C		

Annexure 5.26 Activities by Households to Reduce Solid Waste Risk?

What	No.	When	No.	Why	No.
Nothing	2				
Clean house	1				
Clean my yard	8	2008	1		
Clean area in front of home	5				
Put solid waste in black plastic bag	17	2008	1		
		Late 2009	1		
Put solid waste in wheelie bin	1				
Take solid waste to open land	14				
Take solid waste to container	14	2008	1		
		Jan 2010	1		
When container full, take solid waste to open land	1				
Tell people to put solid waste in container, not open area	1	2008	1		
Use calamine	1				
When we see solid waste around, we know we should pick it up, but we don't always do it.	1	Since the World Cup	1	I don't like dirty places	
Clean solid waste from drain	1	2009	1	To protect children	1
Clean street area	1				
We try to clean with other families	1	June 2010		Community was very dirty	1
Wrote sign beside tap "Don't dump here please"	1	June 2010	1	It was making the water dirty	1